

**Before the
Department of Health and Human Services
Food and Drug Administration**

Washington, D.C.

TO: Commissioner of Food and Drugs

Dockets Management Branch,
Food and Drug Administration,
Department of Health and Human Services,
Rm. 1-23, 12420 Parklawn Dr.
Rockville, Maryland 20857

RE: Citizen petition requesting the ban of sales of all reptiles for use as pets.

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INTRODUCTION

The organization described below submits this petition pursuant to 21 C.F.R. § 10.30 and hereby request the Commissioner of Food and Drugs to amend a regulation, 21 C.F.R. § 1240.62, to prohibit the sale of all reptiles as pets, under the authority granted the Commissioner by the Public Health Service Act, 42 U.S.C. § 264 (1994), to make regulations necessary to prevent the introduction, transmission, or spread of communicable diseases.

In 1975, in response to findings that pet turtles were responsible for a substantial number of *Salmonella* infections nationwide, the FDA banned sales of turtle eggs and small turtles with carapaces less than four inches long. 21 C.F.R. 1240.62. This measure greatly reduced the number of reptile-associated salmonellosis cases in the short-term. In recent years, however, there has been a tremendous increase in the number of reptiles (other than small turtles) sold as pets. This increase has led to a public health problem of comparable dimension to that caused by the early 1970s trade in small turtles. An estimated 76,000 to 140,000 persons per year contract salmonellosis from direct or indirect contact with pet reptiles. Small children -- who, along with immunologically impaired adults

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and the elderly, most often suffer complications and long-term health damage from salmonellosis -- contract the illness from reptiles in disproportionate numbers. The number of reptile-associated salmonellosis cases remains unacceptably high, despite repeated efforts by the Centers for Disease Control and Prevention (CDC), state health agencies, and the pet industry to warn the public of the health threat posed by keeping reptiles. A ban on the sale of all reptiles as pets would eliminate this completely avoidable and unnecessary health threat.

PETITIONER

The Humane Society of the United States ("The HSUS") is a non-profit, charitable corporation having over 7 million members and constituents nationwide. Among The HSUS's charter purposes is to "protect all living things, especially animals, children, and the aged from cruelty and neglect" Certificate of Incorporation of The Humane Society of the United States, Article Third, ¶ 1 (1954). The HSUS is committed to studying and improving all aspects of the consumer-companion animal relationship by, *inter alia*, providing information to guide appropriate selection of and care for companion animals. The HSUS also works to increase public knowledge of connections between the treatment of animals and matters of human health and safety. An example of this commitment is The HSUS's "First Strike" campaign, which promotes understanding among law enforcement personnel and the public of the relationships between animal cruelty

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and other forms of violence and crime.

In furtherance of these purposes, The HSUS publishes informative and educational materials for the public and provides information to Congress and agencies of federal, state, and local governments and, where appropriate, promotes changes and improvements in the status and welfare of animals. The HSUS has a history of involvement in issues of reptile-related salmonellosis and the reptile trade. In 1974, The HSUS submitted a supporting petition to the Food and Drug Administration arguing in favor of the proposed ban on the sale of small turtles. *See* 39 Fed. Reg. 18464 (1974). Also in 1974, The HSUS submitted a supporting petition to the Consumer Product Safety Commission requesting that pet turtles be declared a hazardous product under the Consumer Product Safety Act. For several years after the FDA promulgated the existing ban on the sale of small turtles, The HSUS monitored and encouraged enforcement of the ban and opposed the turtle-raising industry's efforts to have the ban modified. *See, e.g.*, HSUS submissions in FDA Docket No. 78P-0037. In 1986, The HSUS submitted a petition to the U.S. Fish and Wildlife Service requesting that the red-eared turtle be included in Appendix II of the Convention on International Trade in Endangered Species (CITES). In 1999, The HSUS requested that the Fish and Wildlife Service list the green iguana as injurious under the Lacey Act because captive iguanas released into the wild in the United States may negatively impact native species.

DISCUSSION

A. ACTION REQUESTED.

Petitioner requests that the FDA amend the current regulation banning the sale of small turtles, 21 C.F.R. § 1240.62, in the following manner:

1. Current subsection (a), which states:

Definition. As used in this section the term "turtles" includes all animals commonly known as turtles, tortoises, terrapins, and all other animals of the order *Testudinata*, class *Reptilia*, except marine species (families *Dermachelidae* and *Chelonidae*).

should be amended to state:

Definition. As used in this section the term "reptiles" includes all animals commonly known as turtles, snakes, lizards, and crocodilians, and all other animals of the class *Reptilia*.

2. Current subsection (b), which states:

Sales; general prohibition. Except as otherwise provided in this section, viable turtle eggs and live turtles with a carapace length of less than 4 inches shall not be sold, held for sale, or offered for any other type of commercial or public distribution.

should be amended to state:

Sales; general prohibition. Except as otherwise provided in this

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section, viable reptile eggs and live reptiles shall not be sold, held for sale, or offered for any other type of commercial or public distribution.

3. Throughout the rest of § 1240.62, all references to “turtles” or “turtles with a carapace length of less than 4 inches” should be replaced by the term “reptiles,” and all references to “turtle eggs” should be replaced by the term “reptile eggs.”

See 21 C.F.R. § 1240.62 (attached hereto)

B. STATEMENT OF GROUNDS.

1. BACKGROUND.

a. Transmission And Symptoms of *Salmonella* Infection.

Most cases of human salmonellosis are caused by food-borne bacteria; however, a significant portion are caused by contact with reptiles and other animals. Constance C. Austin and Melinda J. Wilkins, *Reptile Associated Salmonellosis*, 212 J. Am. Veterinary Med. Ass’n 866 (1998).

Small children, the elderly, and persons with compromised immune systems are more likely to develop salmonellosis and suffer complications and long-term health impairments than healthy adults. Jonathan Mermin, *et al.*, *Iguanas and Salmonella Marina Infection in Children: A Reflection of the Increasing Incidence of Reptile Associated Salmonellosis in the United States*, 99 Pediatrics 399 (1997).

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The symptoms of *Salmonella* infection include fever, stomach cramps, nausea, vomiting and diarrhea. Centers for Disease Control and Prevention (CDC), *Salmonellosis Technical Information*, January, 1998, <http://www.cdc.gov/ncidod/dbmd/diseaseinfo/salmonellosis_t.htm>. In severe cases, the infection may spread from the intestinal wall and cause meningitis, sepsis, and other serious complications. Mermin, *et al.*, *supra*, at 399. About 500 fatal cases occur each year. CDC, *Salmonellosis Technical Information*, *supra*. An increasing proportion of isolates of common *Salmonella* serotypes show resistance to antibiotics. *Id.*

b. Background of the Current Ban on Sales of Small Turtles as Pets.

In 1971, the peak of the trade in baby turtles as pets, approximately 15 million baby turtles were sold in the United States. 37 Fed. Reg. 24671 (1972). In administrative history, the FDA found that in the United States each year as many as 280,000 cases of salmonellosis were caused by pet turtles. *Id.*

Recognizing the severity of the health crisis caused by the sale of baby turtles, the FDA issued regulations in 1972 requiring certain small pet turtles and turtle eggs shipped in interstate commerce to be certified free from *Salmonella* bacteria. 37 Fed. Reg. 24672 (1972). Although the certification program was sufficiently burdensome to curtail the number of turtles sold, it was not successful in eliminating *Salmonella* bacteria from pet turtles: studies found that many batches of certified turtles later tested positive for *Salmonella*. 40 Fed. Reg. 22543

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(1975)

In response to these findings, the FDA published alternative proposals for strengthening the regulation of the pet turtle trade. One proposal involved a nearly complete ban on the importation and interstate shipment of turtles with carapaces of four inches in length or smaller; the second proposal involved the implementation of more sensitive testing procedures for the *Salmonella*-free certification process. 39 Fed. Reg. 18463 (1974).

In May 1975, the FDA published final regulations banning the sale of viable turtle eggs and live turtles with carapaces less than four inches in length.¹ 40 Fed. Reg. 22545 (amending 21 C.F.R. § 1240.62). The FDA had received 248 comments in response to the proposed rule. A majority of the comments supported the ban, but a number of comments objected to the ban or made alternative proposals. The preamble to the final rule discussed numerous reasons for adopting a ban rather than any other option. A summary of certain aspects of the preamble to the 1975 regulations is pertinent to this petition:

Responding to comments asserting that restrictions on the sale of turtles would infringe on constitutional rights of pet ownership, the FDA noted that individuals' ownership rights "must be weighed against the public hazard that may

¹The regulations contain the following exceptions to the ban: sales of certain marine turtles; turtles sold for bona fide scientific, educational, and exhibitional purposes; turtles sold by non-businesses; and sales of turtles intended for export only. 21 C.F.R. § 1240.62.

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be caused by allowing the sale of pets that may be contaminated with organisms dangerous to human health.” 40 Fed. Reg. 22543 at 22544 (1975). The FDA found that the severity of the health threat posed by turtle-related salmonellosis outweighed the property interests of persons wishing to buy turtles. *Id.*

The FDA also addressed a comment that criticized the statistical relationship between turtle ownership and its impact on human salmonellosis. The comment pointed out that there had been an apparent increase in the number of salmonellosis cases in the U.S. between 1972 and 1975, even though there had been a dramatic decline in the number of turtles sold during that period, thereby calling into question the reliability of a widely cited 1972 study concerning the prevalence of turtle-human transmission of the *Salmonella* organism.² The FDA’s response indicated that its decision to impose the ban was not made because the agency had concluded that a specific number of turtle-related salmonellosis cases had actually occurred, but rather the decision was compelled by the general recognition that reptile-related salmonellosis posed a substantial public health problem. The FDA recognized that statistical studies of the causes of salmonellosis are hampered by irregular reporting and further complicated by the fact that salmonellosis may be

²The study at issue provided a “rough estimate” that 14 % or 280,000 of the total salmonellosis cases in the U.S. each year were caused by turtles. Steven H. Lamm, *et al.*, *Turtle-Associated Salmonellosis: I. An Estimation of the Magnitude of the Problem in the United States 1970-71*, 95 Am. J. Epidemiology 511, 514-15 (1972).

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contracted by a variety of means, not just from turtles. Nonetheless, the FDA finally rejected the comment's argument, stating that "it has previously been established that turtles are a significant source of *Salmonella* contamination and evidence has not been presented that demonstrates otherwise." *Id.*

In several places, the preamble to the 1975 regulations reflected the particular concern that children were disproportionately affected by salmonellosis caused by contact with turtles. In particular, the FDA rejected a proposal that would have prohibited the sale of turtles only to persons under eighteen years old. The FDA observed that most turtles were actually purchased by adults for their children, so such a regulation would have little effect. *Id.* at 22545.

The FDA further emphasized that the ban on small turtles was necessary because "small children, for whom most pet turtles are purchased, cannot be expected to understand the reasons for, or abide by, sanitary measures that might protect them from illness." *Id.* at 22544. Therefore, the FDA concluded, a total ban on the sale of small turtles as pets "is the only effective method at the present time that will eliminate the possibility of human illness due to contaminated turtles since there was no evidence presented that an improved certification scheme and written warnings at the time of sale would effectively control the *Salmonella* . . . problem." *Id.*

Subsequent research justified the FDA decision to ban turtle sales. A 1980 study found that an 18% decrease in all *Salmonella* isolates among children from

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one to nine years old between 1971 and 1976 correlated to state and federal regulations curtailing sales of small turtles during that period. The authors found that this figure was consistent with estimates that turtle-associated salmonellosis accounted for 14% of human salmonellosis cases prior to regulation of turtle sales, and the study concluded that this result “suggests that turtle-associated human salmonellosis has been almost totally eliminated.” Mitchell L. Cohen, *et al.*, *Turtle-Associated Salmonellosis in the United States: Effect on Public Health Action, 1970 to 1976*, 243 J. Am. Med. Ass’n, 1247, 1249 (1980).

2. ARGUMENT.

a. All Reptiles Are Potential Sources of *Salmonella* Infection.

All reptiles may be carriers of *Salmonella*. D. Douglas Graham, *Handle With Care*, Pet Age, March 1998, at 12, 13. The bacteria have been found in significant proportions of turtles, snakes, and lizards; the percentage of reptiles harboring the bacteria may be as high as 83.6% to 93.7%, depending on the method of testing. Roderick J. Chiodini and John Sundberg, *Salmonellosis in Reptiles: A Review*, 115 Am. J. Epidemiology 494, 495 (1981).

Reptiles often carry highly virulent strains of *Salmonella* without showing symptoms. *Id.* at 496. Attempts to eliminate *Salmonella* in reptiles with antibiotics have been unsuccessful, and this practice can lead to *Salmonella* strains

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with increased antibiotic resistance. David L. Woodward, *et al.*, *Human Salmonellosis Associated with Exotic Pets*, 35 J. Clinical Microbiology 2786, 2789 (1997). Reptiles exhibit great irregularity in shedding *Salmonella* bacteria--an animal may provide a negative culture one day, and be positive the next. Chiodini and Sundberg, *supra*, at 496. Further, treatment of reptiles with antibiotics appears to suppress shedding of detectible *Salmonella* bacteria without actually eliminating the *Salmonella*. *Id.* at 497. Thus, a reptile may appear and even test *Salmonella* free, and begin to shed the bacteria at any time after testing. According to Stephanie Wong, a veterinarian with the CDC's food-borne and diarrheal disease branch, "there is no way to say that a reptile is *Salmonella*-free." Susan Okie, *Reptiles and Toddlers Don't Mix*, The Washington Post, November 16, 1999 at Z12.

b. A Vast Market in Non-turtle Reptiles Has Burgeoned Since the FDA Banned the Sale of Small Turtles.

Hundreds of species of reptiles are imported to the United States from all parts of the world. Craig Hoover, *The U.S. Role in the International Live Reptile Trade: Amazon Tree Boas to Zululand Dwarf Chameleons* 8 (1998). Approximately 2.7 million, or 3%, of U.S. households own at least one reptile. American Pet Products Manufacturers Association, Inc., *1999-2000 APPMA National Pet Owners Survey* 320 (1999). On average, reptile-owning households own 2.9 reptiles each, for a total of nearly 8 million pet reptiles in the United States. *Id.* at 324. The top

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five reptile species imported to the United States between 1991 and 1995 were the green iguana (3.4 million), ball python (467,000), boa constrictor (138,000), savannah monitor (129,000), and the Senegal chameleon (50,000). Hoover, *supra*, at 17 (1998).

The current “fad” pet reptile appears to be the green iguana, and in that sense the iguana has replaced small turtles as the mainstay of U.S. reptile sales. From 1989 through 1993 annual iguana imports increased 431% from 143,000 to 760,000 animals. David M. Ackman *et al.*, *Reptile Associated Salmonellosis in New York*, 14 *Pediatric Infectious Disease J.* 955 (1995). In 1995, 2.5 million reptiles were imported and 45% of these were iguanas. Hoover, *supra*, at 16.

c. A Significant Portion of Human *Salmonella* Infections Are Attributable to Reptile Transmission.

According to the CDC, “reptile-related salmonellosis continues to pose a substantial threat to human health.” Centers for Disease Control and Prevention (CDC), *Reptile-Associated Salmonellosis — Selected States, 1996-98*, 48 *Morbidity and Mortality Wkly. Rep.* 1009, 1010 (1999). Attempts to pin down the proportion of human salmonellosis cases attributable to reptiles have had varied results. Most studies place the portion of all salmonellosis cases attributable to reptiles at between 3% and 10%. CDC, *Reptile-Associated Salmonellosis — Selected States, 1996-98*, *supra*, at 1010 (estimating 7%); Jeffrey V. Yule, *Reptile-Associated Salmonella: Two Recent Cases in Context*, *Reptile and Amphibian Magazine*, Sept-

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Oct. 1996, at 84, 88 (estimating 10%); Ackman, *et al.*, *supra*, at 956 (estimating 3% to 4%).

The number of cases of human salmonellosis attributable to reptiles is difficult to establish for several reasons. See Ackman, *et al.*, *supra*, at 957-58. First, a commonly used method for gauging the role of reptiles in causing *Salmonella* infections is by reference to the number of “reptile-associated” serotypes isolated from salmonellosis cases. The CDC has defined reptile-associated serotypes as “isolates from nonhumans reported to the CDC and the US Department of Agriculture that are isolated from reptiles $\geq 50\%$ of the time.” CDC, *Reptile-Associated Salmonellosis — Selected States, 1996-98*, at 1011. Thus “reptile-associated serotypes” are not necessarily exclusive to reptiles--conceivably, a person could contract an illness caused by a reptile-associated *Salmonella* serotype from a non-reptile source. On the other hand, several extremely common *Salmonella* serotypes that would not fit the definition of “reptile-associated” (because more than 50% of isolates are from non-reptile sources) have in fact been isolated from reptiles. See Ackman, *et al.*, *supra*, at 957 (“Of the 10 most frequently isolated *Salmonella* serotypes in New York State, at least 8 have been implicated in turtle-associated zoonotic salmonellosis.”). Among the non “reptile-associated” serotypes that have been isolated from reptiles is *Salmonella* Typhimurium. *Id.*; Chiodini and Sundberg, *supra*, at 495. This serotype alone accounts for 26% of all reported human salmonellosis cases. CDC, *PHLIS Surveillance Data--Salmonella*,

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1998 Annual Summary, Table 1, (visited January 24, 2000) <<http://www.cdc.gov/ncidod/dbmd/phlisdata/salmtab/HTM981.HTML>>. Studies and reported cases show that this common *Salmonella* serotype is associated with turtles and with non-turtle reptiles. See, e.g., D.K. Onderka and M.C. Finlayson, *Salmonellae and Salmonellosis in Captive Reptiles*, 49 Can. J. Comp. Med. 268, 269 (finding *Salmonella* Typhimurium infections in two snakes in a study of 150 pet reptiles); CDC, *Reptile-Associated Salmonellosis--Selected States, 1996-1998, supra*, at 1009 (*Salmonella* Typhimurium transmitted to two brothers (ages three and six years old) from pet corn snakes). For this reason, studies that extrapolate the total number of reptile-caused cases of salmonellosis from the number of cases caused by "reptile-associated serotypes" may underestimate the magnitude of the problem. Ackman, *et al.*, *supra*, at 957-58.

Second, it is estimated that only between 1% and 5% of *Salmonella* infections are reported to the CDC. Mermin, *et al.*, *supra*, at 400. Estimates of the total number of salmonellosis cases must be extrapolated from the number of reported cases. In 1998, approximately 33,700 total salmonellosis cases were reported to the CDC, down from 34,600 in 1997 and 39,000 in 1996. *PHLIS Surveillance Data, supra*, Table 3, <<http://www.cdc.gov/ncidod/dbmd/phlisdata/salmtab/HTM983.HTML>>. Based on these figures, it would appear that there were between 670,000 and 3.4 million total cases of salmonellosis in 1998, and correspondingly greater numbers in the preceding years. Published estimates are

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roughly consistent with these numbers. See CDC, *Salmonella Technical Information, supra* (estimating 800,000 to 2 million cases occur annually); David Mattingly, *Nightmare of the Iguana*, CNN Interactive (June 6, 1997)(transcript of interview with Dr. Jonathon Mirmen, estimating 2 million to 4 million cases of salmonellosis occur annually) <<http://www.cnn.com/CNN/Programs/americanedge/program/iguana/index.html>>.

Accepting as reasonable midrange numbers the CDC estimates of both the total number of salmonellosis cases (800,000 to 2 million) and the percentage of cases that are reptile related (7%), CDC, *Reptile-Associated Salmonellosis — Selected States, 1996-98, supra*, at 1010, the actual number of reptile-related cases ranges from 76,000 to 140,000 annually.

More significantly, whatever the actual number of reptile-related salmonellosis cases, the number of salmonellosis cases caused by reptiles has generally increased during the 1990s. According to the CDC, “[i]solation of rare serotypes of *Salmonella* spp. can alert public health staff about trends in the transmission of infection from reptiles to humans.” CDC, *Reptile-Associated Salmonellosis — Selected States, 1996-98, supra*, at 1011. “Since 1986, the popularity of iguanas and other reptiles that can transmit infection to humans has been paralleled by an increased incidence of *Salmonella* infections caused by reptile-associated serotypes.” CDC, *Reptile-Associated Salmonellosis — Selected States, 1994-95*, 44 Morbidity and Mortality Wkly. Rep. 347, 350 (1995); see

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Mermin, *et al.*, *supra*, at 400. CDC data graphically demonstrate this relationship. The rate of reptile-associated *Salmonella* serotypes isolated from humans reported to the CDC has nearly doubled during the 1990s, from 7.6 cases per 10 million people in 1989 to 15.7 cases per 10 million people in 1998.³ CDC, *U.S. Salmonella Surveillance System* (August, 1999)(unpublished data). Particularly illustrative is the trend of increased incidence of *Salmonella* Marina, a rare serotype strongly associated with reptiles. *See* Mermin, *et al.*, *supra*, at 399. CDC data show that the incidence of *Salmonella* Marina shot up from only two reported cases in 1989 to seventy-five reported cases in 1995. *PHLIS Surveillance Data*, *supra*, Table 3. Because only 1% to 5% of *Salmonella* cases are reported, these figures may represent an increase of up to 7,300 cases between 1989 and 1995 of salmonellosis caused by *Salmonella* Marina alone. *See* Mermin, *et al.*, *supra*, at 400.

During the same period, reptile imports to the United States increased radically. One study reviewed Fish and Wildlife Services databases for import figures on one hundred species that are common in the international reptile trade.

³The numbers of reptile-associated *Salmonella* cases and total *Salmonella* cases reported to the CDC both fluctuate from year to year. For example, the number of reported reptile-associated *Salmonella* cases peaked at 19.2 cases per 10 million population in 1996, but was down to 15.7 cases per 10 million population in 1998. CDC, *U.S. Salmonella Surveillance System* (unpublished data), *supra*. However, during the same period, the total number of reported *Salmonella* cases also declined: in fact, the percentage of all reported cases that were reptile-associated was the same in 1996 and 1998. This figure (1.5%) was the highest of any year included in CDC data from 1963 to 1998, indicating that the prevalence of reptile-associated *Salmonella* did not decline between 1996 and 1998. *Id.*

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Hoover, *supra*, at 15. According to this study, imports of these selected reptile species skyrocketed from just over 200,000 in 1989 to over 1.4 million in 1995. *Id.* Based on this data, it is clear that the number of reptile-related salmonellosis cases has increased dramatically along with the size of the reptile trade.

d. Reptile-associated Salmonellosis Disproportionately Affects Children.

Most people who contract *Salmonella* infections from reptiles are infants and small children. *Reptile-Associated Salmonellosis--Selected States, 1996-98* at 1011. According to the State of New York Department of Health, almost half of the reported reptile-associated cases are infants less than one year old, and more than 20% of the infected children require hospitalization. State of New York Department of Health, *Department of Health News* (February 5, 1996) <<http://www.health.state.ny.us/nysdoh/consumer/pressrel/reptiles.htm>>.

One recent study focused on the risk factors for *Salmonella* Marina, a serotype strongly associated with reptiles. Mermin, *et al, supra*. The study found that 81% of the sample *Salmonella* Marina isolates were from infants less than one year old. Moreover, most of the patients studied were reported to have had only indirect, often very attenuated, contact with an iguana during the week prior to onset of illness. *Id.* at 400. Similarly, another study found that 44% of *Salmonella* cases with reported reptile exposure were children less than one year old. Ackman, *et al., supra*, at 956

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The reasons why infant and small children are at particular risk from contracting *Salmonella* from reptiles are not fully understood. Although *Salmonella* is associated with reptiles, “the exact means of transmission of *Salmonella* may be subtle.” Mermin, *et al.*, *supra* at 401. The *Salmonella* bacteria are extremely durable and can live for long periods outside of a host body — up to eighty-nine days in tap water and thirty months in reptile stool samples, for example. Chiodini and Sundberg, *supra*, at 496. Most cases of reptile-associated salmonellosis in children are not caused by direct contact between the child and the reptile. Mermin, *et al.*, *supra*, at 400; Ackman, *et al.*, *supra*, at 957. Cases have even been reported where no reptile lives in the home with the affected child, but where a person who owns reptiles has visited the home of the child. Mermin, *et al.*, *supra*, at 401; Ackman, *et al.*, *supra*, at 957.

Among the factors that have been suggested that may contribute to the prevalence of reptile-related salmonellosis among children are: children have less developed immune systems than adults; contact with reptiles may expose children to particularly high doses of bacteria; and that some reptile-associated *Salmonella* serotypes may be especially invasive. Mermin, *et al.*, *supra*, at 401. In addition, reptile owners are much more likely to have children than the general population, indicating disproportionate opportunity for exposure among children. According to a pet industry survey, 60% of reptile owners have children younger than eighteen years old; whereas, only 35% of the survey sample from the general population have

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children. American Pet Products Manufacturers Association, *supra*, at 34.7

Undoubtedly, the central factor that the FDA cited in 1975 to justify the ban on small turtles continues to contribute to the incidence of reptile-associated *Salmonella* illness in children: small children simply cannot be expected to understand warnings and abide by sanitary measures that might protect them. 40 Fed. Reg. 22544. In recognition of this and the substantial danger of infection by indirect means, the CDC warns that reptiles should simply not be allowed in households where children under five years old live. CDC, *Reptile-Associated Salmonellosis — Selected States, 1996-98, supra*, at 1012.⁴

⁴The full set of CDC recommendations for preventing transmission from reptiles follows:

Pet store owners, veterinarians, and pediatricians should provide information to owners and potential purchasers of reptiles about the risk for acquiring salmonellosis from reptiles.

Persons should always wash their hands thoroughly with soap and water after handling reptiles or reptile cages.

Persons at increased risk for infection or serious complications of salmonellosis (e.g., children aged less than 5 years and immunocompromised persons) should avoid contact with reptiles.

Pet reptiles should be kept out of households where children aged less than 5 years or immunocompromised persons live. Families expecting a new child should remove the pet reptile from the home before the infant arrives.

Pet reptiles should not be kept in child care centers.

Pet reptiles should not be allowed to roam freely throughout the home or living area.

Pet reptiles should be kept out of kitchens and other food-preparation areas to prevent contamination. Kitchen sinks should not be used to bathe reptiles or to wash their dishes, cages, or aquariums. If bathtubs are used for these purposes, they should be cleaned thoroughly and disinfected with bleach.

CDC, *Reptile-Associated Salmonellosis — Selected States, 1996-98, supra*, at 1012.

**e. Public Education Will Not Be Effective to Significantly
Reduce the Threat of Reptile-related *Salmonella*.**

Throughout the mid and late 1990s, the CDC and state health agencies have repeatedly issued public warnings regarding the health risks posed by pet reptiles. There is no evidence that the number of reptile-related cases of salmonellosis has decreased in response to such public education mandates.

In 1994, the State of New York Department of Health issued a health alert to 1,300 pet stores statewide. The notice contained information on reptile-handling hygiene and instructed pet store owners to post the notice and to provide it to all customers purchasing reptiles. *Department of Health News, supra*. In 1996, the CDC and Pet Industry Advisory Council began a campaign of public education that also includes posters and brochures distributed to pet stores nationwide. Other states have issued health alerts to pet stores to warn owners and prospective owners about the risks for salmonellosis associated with reptile contact and asked store owners to post and distribute the alerts. *Reptile Associated Salmonellosis — Selected States, 1994-1995*.

A broader campaign of public education is unlikely to be effective. PETsMART found that its self-initiated efforts to educate the public regarding reptile-related *Salmonella* and other issues failed due to employee turnover and sheer failure of customers to heed the information made available to them. Steve Dale, *You Want an Iguana?: Do Research Before Buying Green Lizard*, The Arizona

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Republic, November 6, 1999, at AH 19. Finally, as was the case with small turtles in the 1970s, children are the most in need of protection from reptile-related *Salmonella* and the least capable of understanding and heeding public health warnings. It is already the case that the majority of reptile-related cases are not caused by direct contact -- simply keeping children away from pet reptiles does not work. Strict and widespread public adherence to all of the CDC's recommendations would be required to reduce the number of cases by any substantial amount. History and experience do not support the notion that any feasible public education campaign could effect such a change in public behavior.

**f. Prohibiting the Sale of Reptiles as Pets Would Not
Significantly Impair Property or Other Interests of the
Majority of the Public.**

The vast majority of iguanas die or are abandoned by their owners before they reach adulthood. Dale, *You Want an Iguana?*, *supra*; Amy Collins, *Scaly Model Pets: 2-Day Event to Focus on Reptile Care*, *The Daily News of Los Angeles*, October 25, 1997 at N4. However, this fate is not exclusive to iguanas -- it is estimated that 90% of snakes die within the first six months of pet ownership. Andy Lloyd, *Making Hiss-tory: Snake Expert and Vet Launches the North East's First Rescue Service for Slippery Reptiles*, *Evening Chronicle*, August 27, 1998, at 49. In fact, for the past few years, the press has been replete with stories concerning the unsuitability of reptiles as pets, the failure of pet stores to provide

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sufficient information regarding reptiles, the common misapprehension among reptile purchasers that reptiles require little maintenance, and the resulting high rate of injury, death, and abandonment of the animals. *E.g.*, Jim Gialamas, *Urban Tactics: Snitching on a Snake?* The New York Times, Oct. 24, 1999, § 14 at 3; Steve Dale, *Truth about Green Iguanas*, The Arizona Republic, August 14, 1999, at AH14; Karen Schafer, *A Dog's Life or Death: Unwanted Pets Often Suffer, But Not If Their Owners Seek Help*, The Washington Post, Sept. 1, 1997 at D6.

Most reptiles die prematurely because conditions in captivity simply do not meet their needs for survival. Nancy L. Anderson, *Husbandry and Clinical Evaluation of Iguana iguana*, 13 The Compendium: North American Edition 1265, 1266 (1991). Many important issues of care and nutrition for reptiles appear unresolved, even among experts. Shawn Messonnier, *Current Controversies in Reptile Medicine — Green Iguanas*, Reptile and Amphibian Magazine, Nov.-Dec. 1995 at 48, 49. For example, Messonnier notes that ultraviolet lights are recommended for all reptiles, but the amount of UV-B radiation needed is unknown. Moreover, compared to the amount of UV-B radiation available to tropical species of reptiles in the wild, commercial full-spectrum lamps would provide insufficient UV-B radiation even if the reptile was exposed twenty-four hours per day. *Id.* at 54. Some reptile experts believe that it is impossible to adequately care for reptiles as pets. Nicholas Read, *New Curbs on Trade in Animals Needed*, The Vancouver Sun, Sept. 17, 1996, at A15.

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These fundamental difficulties in caring for reptiles are exacerbated by the fact that reptiles, and currently iguanas in particular, are marketed as easy, low maintenance pets to consumers who do not realize the difficulties presented by the care and feeding of the animals. Baby iguanas five to six inches in length are commonly sold for less than ten dollars. Dale, *You Want an Iguana?*, *supra*. Unknown to many prospective owners, these tiny lizards will grow to be five to six feet in length, assuming proper care, *id.*, and will become unpredictable and aggressive. Graham, *supra*, at 14; Collins, *supra*. For these reasons, PETsMART has ceased selling iguanas and savannah monitors. According to Nick St. Erme, quality assurance manager for PETsMART, the pet store chain tried to educate customers and its own clerks, but turnover of employees and the fact that people did not read the posted signs doomed this effort. Dale, *You Want an Iguana?*, *supra*.

Although exact figures of pet reptile abandonment are not possible to ascertain, because many reptiles are simply “set free” and many smaller animal shelters do not keep comprehensive computerized records, relinquishment of reptiles to shelters and rescue leagues appears to have reached epidemic proportions. The Rhode Island Herpetological Society reported having taken in more than 400 iguanas during 1997. Karen Lee Ziner, *Scaling Down on Exotic Pet Gifts*, The Providence Journal-Bulletin, Dec. 22, 1998 at 1A. The Washington (D.C.) Humane Society took in 101 reptiles in 1999, including fifteen boa

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constrictors, thirteen pythons, and twenty-nine iguanas. Washington Humane Society (January 20, 2000) (unpublished data).

As with small turtles in the 1970s, the majority of reptiles sold in the United States are inexpensive pets, casually purchased and little understood by their new owners. Millions of reptiles are sold each year, and millions die prematurely or are abandoned or relinquished as a result. Considering that “sadness when they die” is reported as the primary drawback of reptile ownership, American Pet Products Manufacturers Association, Inc., *supra*, at 325, it is safe to say that the true interests of majority of the public would not be negatively affected if the sale of reptiles is prohibited.

3. CONCLUSION.

In 1975, the FDA found that turtles were a “significant source of *Salmonella* infection.” 40 Fed. Reg. 22544. Since the 1975 ban on the sale of small turtles as pets, there has been a surge in the import and sale of non-turtle reptiles, all of which may, and the overwhelming majority clearly do, carry *Salmonella*. This has led to such a corresponding resurgence in the incidence of reptile-related human salmonellosis cases, particularly among children, that the CDC and state health agencies have issued numerous warnings to pet stores and the public regarding this “substantial threat to human health.” CDC, *Reptile-Associated Salmonellosis — Selected States, 1996-1998*, *supra*, at 1010. Unfortunately, there is no evidence that

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these warnings have been effective in reducing the number of reptile-related salmonellosis cases.

Moreover, as with turtle ownership in the 1970s, there is no compelling public interest at stake that would even begin to outweigh the public health benefit that would be realized from banning the sale of reptiles as pets. Keeping reptiles as pets amounts to, at best, a transitory property interest, and, at worst, a tragic and pathetic waste of wildlife.

For the above-stated reasons Petitioner respectfully requests that the FDA amend 21 C.F.R. § 1240.62 to prohibit the sale of all reptiles as pets.

C. ENVIRONMENTAL IMPACT.

The action proposed in this petition is expected to have no substantial negative environmental impact. Several negative environmental effects of the reptile trade may actually be ameliorated by the proposed action. A number of exotic reptile species have been introduced to the United States, particularly in Florida and Hawaii. Hoover, *supra*, at 48. Exotic species are known to threaten native species with which they compete and on which they prey. In addition, a substantial illegal trade in reptiles that are protected in their native countries has been documented. Hoover, *supra*, at 37-38. A ban on the sale of reptiles as pets may serve to protect native species in the United States from unnatural competition and predation, and also protect native species abroad from depletion.

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Overcollection of indigenous U.S. species for the pet trade is also an increasing problem that would be alleviated by the proposed ban. *See, e.g.*, 62 Fed. Reg. 59616, 59617 (administrative history accompanying the final rule listing two species of bog turtle as threatened); Mark R. Jennings, *et al.*, *Amphibian and Reptile Species of Special Concern — Final Report Submitted to the California Department of Fish and Game* 156-61 (1994).

Alternatives to an outright ban include:

1. Requiring pet stores and others selling reptiles to warn potential customers of the potential health consequences of keeping a pet reptile;
2. Establishing a minimum age for purchase of a reptile; and
3. Prohibiting the sale of reptiles under a certain sizes.

For reasons stated in section 2.e. of this petition (at pages 22 to 23, *supra*), Petitioner does not believe that the first alternative would be effective.

A minimum age for purchase of reptiles would also not be effective in eliminating reptile-related *Salmonella* infections in small children. In most documented cases of reptile-related salmonellosis in small children, the child did not directly handle the reptile. The infection was passed to the child indirectly by another person who touched the child. The age of the person purchasing the reptile is irrelevant. At-risk individuals are susceptible to infection whenever they come into contact with another person or thing that has touched or even been near a reptile.

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Petitioner believes that regulations prohibiting the sale of small or immature reptiles would be somewhat effective in reducing the incidence of reptile-related salmonellosis; however, this alternative would not be the most practical or effective option. Petitioner believes that such a restriction would probably reduce the number of reptiles sold and therefore the number of reptile-related illnesses. It would reduce demand for pet reptiles because it would eliminate many casual reptile buyers — persons who might now buy a small lizard, snake or turtle in the mistaken belief that the animal would be easy to care for and maintain a manageable size and disposition. In addition, the supply of reptiles would most likely decrease and prices would rise because more time and resources must be devoted to raising or capturing, not to mention shipping, larger, more mature, and, in some cases, more aggressive animals.

On the other hand, the size limitation alternative introduces serious complications to the regulation and obstacles to enforcement. If size limitations were imposed, each species of reptile would require a different minimum size to ensure only relatively mature animals were sold. Enforcement of such a regulation would require highly trained inspectors to discern the differences between the different species. Such complex regulations would also reduce the ability of pet stores to ensure that they are in compliance.

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D. CERTIFICATION.

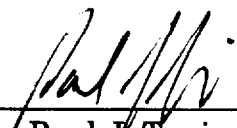
The undersigned certifies that, to the best knowledge and belief of the undersigned, this petition includes all information and views on which the petition relies, and that it includes representative data and information known to the Petitioner which are unfavorable to the petition.

Respectfully Submitted,

The Humane Society
of the United States

By: _____


Roger A. Kindler,
General Counsel


Paul J. Tanis,
Assistant General Counsel

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21 CFR 1240.62

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*** THIS SECTION IS CURRENT THROUGH THE FEBRUARY 21, 2000 ISSUE OF ***
*** THE FEDERAL REGISTER ***

TITLE 21 -- FOOD AND DRUGS
CHAPTER I -- FOOD AND DRUG ADMINISTRATION, DEPARTMENT OF HEALTH AND HUMAN
SERVICES
SUBCHAPTER L -- REGULATIONS UNDER CERTAIN OTHER ACTS ADMINISTERED BY THE
FOOD AND DRUG ADMINISTRATION
PART 1240 -- CONTROL OF COMMUNICABLE DISEASES
SUBPART D -- SPECIFIC ADMINISTRATIVE DECISIONS REGARDING INTERSTATE
SHIPMENTS

21 CFR 1240.62

§ 1240.62 Turtles intrastate and interstate requirements.

(a) Definition. As used in this section the term "turtles" includes all animals commonly known as turtles, tortoises, terrapins, and all other animals of the order Testudinata, class Reptilia, except marine species (families Dermachelidae and Chelonidae).

(b) Sales; general prohibition. Except as otherwise provided in this section, viable turtle eggs and live turtles with a carapace length of less than 4 inches shall not be sold, held for sale, or offered for any other type of commercial or public distribution.

(c) Destruction of turtles or turtle eggs; criminal penalties. (1) Any viable turtle eggs or live turtles with a carapace length of less than 4 inches which are held for sale or offered for any other type of commercial or public distribution shall be subject to destruction in a humane manner by or under the supervision of an officer or employee of the Food and Drug Administration in accordance with the following procedures:

(i) Any District Office of the Food and Drug Administration, upon detecting viable turtle eggs or live turtles with a carapace length of less than 4 inches which are held for sale or offered for any other type of commercial or public distribution, shall serve upon the person in whose possession such turtles or turtle eggs are found a written demand that such turtles or turtle eggs be destroyed in a humane manner under the supervision of said District Office, within 10 working days from the date of promulgation of the demand. The demand shall recite with particularity the facts which justify the demand. After service of the demand, the person in possession of the turtles or turtle eggs shall not sell, distribute, or otherwise dispose of any of the turtles or turtle eggs except to destroy them under the supervision of the District Office, unless and until the Director of the Center for Food Safety and Applied Nutrition withdraws the demand for destruction after an appeal pursuant to paragraph (c) (1)(ii) of this section.

(ii) The person on whom the demand for destruction is served may either comply with the demand or, within 10 working days from the date of its promulgation, appeal the demand for destruction to the Director of the Center for Food Safety and Applied Nutrition, Food and Drug Administration, 200 C St. SW., Washington, DC 20204. The demand for destruction may also be appealed within the same period of 10 working days by any other person having a pecuniary interest in such turtles or turtle eggs. In the event of such an appeal,

the Center Director shall provide an opportunity for hearing by written notice to the appellant(s) specifying a time and place for the hearing, to be held within 14 days from the date of the notice but not within less than 7 days unless by agreement with the appellant (s).

(iii) Appearance by any appellant at the hearing may be by mail or in person, with or without counsel. The hearing shall be conducted by the Center Director or his designee, and a written summary of the proceedings shall be prepared by the person presiding. Any appellant shall have the right to hear and to question the evidence on which the demand for destruction is based, including the right to cross-examine witnesses, and he may present oral or written evidence in response to the demand.

(iv) If, based on the evidence presented at the hearing, the Center Director finds that the turtles or turtle eggs were held for sale or offered for any other type of commercial or public distribution in violation of this section, he shall affirm the demand that they be destroyed under the supervision of an officer or employee of the Food and Drug Administration; otherwise, the Center Director shall issue a written notice that the prior demand by the District Office is withdrawn. If the Center Director affirms the demand for destruction he shall order that the destruction be accomplished in a humane manner within 10 working days from the date of the promulgation of his decision. The Center Director's decision shall be accompanied by a statement of the reasons for the decision. The decision of the Center Director shall constitute final agency action, reviewable in the courts.

(v) If there is no appeal to the Director of the Center for Food Safety and Applied Nutrition from the demand by the Food and Drug Administration District Office and the person in possession of the turtles or turtle eggs fails to destroy them within 10 working days, or if the demand is affirmed by the Director of the Center for Food Safety and Applied Nutrition after an appeal and the person in possession of the turtles or turtle eggs fails to destroy them within 10 working days, the District Office shall designate an officer or employee to destroy the turtles or turtle eggs. It shall be unlawful to prevent or to attempt to prevent such destruction of turtles or turtle eggs by the officer or employee designated by the District Office. Such destruction will be stayed if so ordered by a court pursuant to an action for review in the courts as provided in paragraph (c)(1)(iv) of this section.

(2) Any person who violates any provision of this section, including but not limited to any person who sells, offers for sale, or offers for any other type of commercial or public distribution viable turtle eggs or live turtles with a carapace length of less than 4 inches, or who refuses to comply with a valid final demand for destruction of turtles or turtle eggs (either an unappealed demand by an FDA District Office or a demand which has been affirmed by the Director of the Center for Food Safety and Applied Nutrition pursuant to appeal), or who fails to comply with the requirement in such a demand that the manner of destruction be humane, shall be subject to a fine of not more than \$ 1,000 or imprisonment for not more than 1 year, or both, for each violation, in accordance with section 368 of the Public Health Service Act (42 U.S.C. 271).

(d) Exceptions. The provisions of this section are not applicable to:

(1) The sale, holding for sale, and distribution of live turtles and viable turtle eggs for bona fide scientific, educational, or exhibitional purposes, other than use as pets.

(2) The sale, holding for sale, and distribution of live turtles and viable turtle eggs not in connection with a business.

(3) The sale, holding for sale, and distribution of live turtles and viable turtle eggs intended for export only, provided that the outside of the shipping package is conspicuously labeled

"For Export Only."

(4) Marine turtles excluded from this regulation under the provisions of paragraph (a) of this section and eggs of such turtles.

(e) Petitions. The Commissioner of Food and Drugs, either on his own initiative or on behalf of any interested person who has submitted a petition, may publish a proposal to amend this regulation. Any such petition shall include an adequate factual basis to support the petition, and will be published for comment if it contains reasonable grounds for the proposed regulation. A petition requesting such a regulation, which would amend this regulation, shall be submitted to the Dockets Management Branch, Food and Drug Administration, rm. 1-23, 12420 Parklawn Dr., Rockville, MD 20857.

HISTORY:

[40 FR 22545, May 23, 1975, as amended at 46 FR 8461, Jan. 27, 1981; 48 FR 11431, Mar. 18, 1983; 54 FR 24900, June 12, 1989; 59 FR 14366, March 28, 1994]

AUTHORITY:

AUTHORITY NOTE APPLICABLE TO ENTIRE PART:
42 U.S.C. 216, 243, 264, 271.

NOTES:

NOTES APPLICABLE TO ENTIRE TITLE:

Cross References: Food Safety and Inspection Services, Department of Agriculture: See Meat and Poultry Inspection, 9 CFR CHAPTER III.

Federal Trade Commission: See Commercial Practices, 16 CFR chapter I.

U.S. Customs Service, Department of the Treasury: See Customs Duties, 19 CFR chapter I.

Internal Revenue Service, Department of the Treasury: See Internal Revenue, 26 CFR chapter I.

Bureau of Alcohol, Tobacco, and Firearms, Department of the Treasury: See Alcohol, Tobacco Production and Firearms, 27 CFR chapter I.

NOTES APPLICABLE TO ENTIRE CHAPTER:

[EDITORIAL NOTE: For nomenclature changes to chapter I see 59 FR 14366, Mar. 28, 1994.]

[PUBLISHER'S NOTE: For the uniform compliance date for food labeling regulations under Chapter 1, see 61 FR 67710, Dec. 24, 1996; 61 FR 68145, Dec. 27, 1996; 62 FR 49881, Sept. 23, 1997.]

NOTES APPLICABLE TO ENTIRE PART:

CROSS REFERENCES: For Department of Health and Human Services regulations relating to foreign quarantine, sanitation measures, and control of communicable diseases, see Centers for Disease Control's requirements as set forth in 42 CFR Parts 71 and 72.

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**Before the
Department of Health and Human Services
Food and Drug Administration**

Washington, D.C.

TO: Commissioner of Food and Drugs

**Dockets Management Branch,
Food and Drug Administration,
Department of Health and Human Services,
Rm. 1-23, 12420 Parklawn Dr.
Rockville, Maryland 20857**

**RE: APPENDIX accompanying citizen petition requesting the ban of sales of all
reptiles for use as pets (sources submitted pursuant to 21 C.F.R. § 10.20).**

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March 10, 2000

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The 4% of case patients noted on case investigation forms to have had reptile exposure before onset of illness is also likely an underestimation of the rate of reptile exposure among persons with salmonellosis, because the form did not specifically prompt public health officers to seek this information.

Our study is limited by the selection of a control group imperfectly matched for age. Because of the lack of eligible controls <1 year of age, we extended our matching criteria to allow controls for infants to be ≤ 2 years of age. This difference in the age distribution of case patients and controls is unlikely to have accounted for the association of *Salmonella* infection with reptile ownership but may partly explain the difference in hospitalization rates. Our findings may also be limited by the overall response rate of 57% (24 of 42). Twelve of the nonresponders were persons who had isolates sent to WCL&R for serotyping but were not reported to their county health departments. Although we had no identifying information for these persons, we have no reason to believe they were more or less likely to have owned a pet reptile. Information on other sociodemographic characteristics of cases and controls was not obtained, although we do not think that *Shigella* case patients would be more or less likely to own reptiles than persons with salmonellosis.

Previous studies have found high rates of *Salmonella* carriage among lizards in the wild¹² and in captivity.^{13, 14} In tropical countries outbreaks and sporadic cases of salmonellosis have been associated with reptile exposure. In New Zealand rates of *Salmonella* Saintpaul infection were highest in areas where skink (a small lizard) carrier rates were highest; in many cases index cases in outbreaks had a history of handling lizards or the soil or vegetation where lizards lived.¹⁵ Other investigators have found high rates of *Salmonella* carriage in wild lizards and theorized that lizards are an important link in the cycle of *Salmonella* infection in humans and other animals.^{16, 17} We found that some iguana owners allow their pets to roam freely through the house, a practice that may lead to unsuspected contamination of food or food preparation surfaces. Moreover infants could pick up and ingest iguana feces left on the floor.

In 1970 and 1971 an estimated 280 000 cases of turtle-associated salmonellosis occurred in the United States.¹⁸ At that time the authors estimated that 15 000 000 turtles were sold annually in the United States. These findings led to the ban on importation and interstate traffic of turtles and subsequently a 77% reduction in the frequency of salmonellosis caused by serotypes associated with turtles and an 18% reduction in salmonellosis in children ages 1 to 9 years.¹⁹ Since 1978 the number of iguanas imported to the United

States has increased >1500%, and it is estimated that 2.8 million United States households own a pet reptile (Pet Industry Joint Advisory Council, personal communication, 1994). This growing demand for pet iguanas has been met by a large supply of inexpensive juvenile iguanas raised on farms in Colombia and El Salvador.²⁰ Overcrowding on breeding farms, during shipment and in pet stores may provide opportunities for fecal-oral transmission among animals. We do not know the percentage of imported iguanas harboring *Salmonella*, but rates of asymptomatic carriage as high as 77% in captured lizards have been reported.²¹ If carriage rates in pet iguanas are similar to those reported for other reptiles, they may be an important source of *Salmonella* infection in United States homes.

Based on the initial case reports, the New York State Department of Health issued an advisory to be posted in pet stores warning current and potential owners of reptiles of the risk for salmonellosis and educating them on proper handling and handwashing measures. The Department of Health also amended its gastroenteritis case report form to include specific questions about contact with iguanas, snakes and other reptiles. On the basis of the evidence provided here, we believe that reptiles, and iguanas in particular, are inappropriate pets in households with young children. The CDC has published broader recommendations warning pregnant women, immunocompromised persons and children <5 years of age to avoid contact with reptiles.²²

ACKNOWLEDGMENTS

Work was presented in part at the 34th Interscience Conference on Antimicrobial Agents and Chemotherapy, Orlando, FL, October 5, 1994. We thank William MacKenzie, M.D., Epidemiology Program Office, CDC, and Dale Morse, M.D., New York State Department of Health, for their valuable suggestions at all stages of the study. We are grateful to Fred A. Jlo, D.V.M., and David Swerdlow, M.D., National Center for Infectious Disease, CDC, for their assistance in defining reptile-associated serotypes and to Lanette Wolcott, CDC, for technical editing.

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A randomized trial of chloramphenicol vs. trimethoprim-sulfamethoxazole for the treatment of malnourished children with community-acquired pneumonia

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Children in developing countries who present with malnutrition often have infections, particularly pneumonia, at the time of presentation. We evaluated the initial antibiotic management of 144 Gambian children who presented for the first time with malnutrition and who had clinical or radiologic evidence of pneumonia. They were enrolled in a double blind trial of trimethoprim-sulfamethoxazole vs. chloramphenicol. Most chil-

dren in the study underwent detailed investigations of bacterial and viral etiology as part of another study. The study drug was administered for a week along with oral metronidazole, vitamins and standardized nutritional therapy. Treatment failure was defined as the need for change to parenteral antibiotics during treatment, failure to respond to a week of treatment with the study drug or relapse during the following 2 weeks. There were no differences between the treatment groups in the clinical indicators of severity, etiology or radiologic findings. Thirty-three children were excluded from the analysis because of tuberculosis, inappropriate enrollment or inadequate follow-up. Of the 111 children remaining, 32 (16 in each arm of the study) failed treatment. Clinical failure was not related

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Key words: Malnutrition, chloramphenicol, trimethoprim-sulfamethoxazole, pneumonia, treatment trial, *Streptococcus pneumoniae*, antimicrobial susceptibility.

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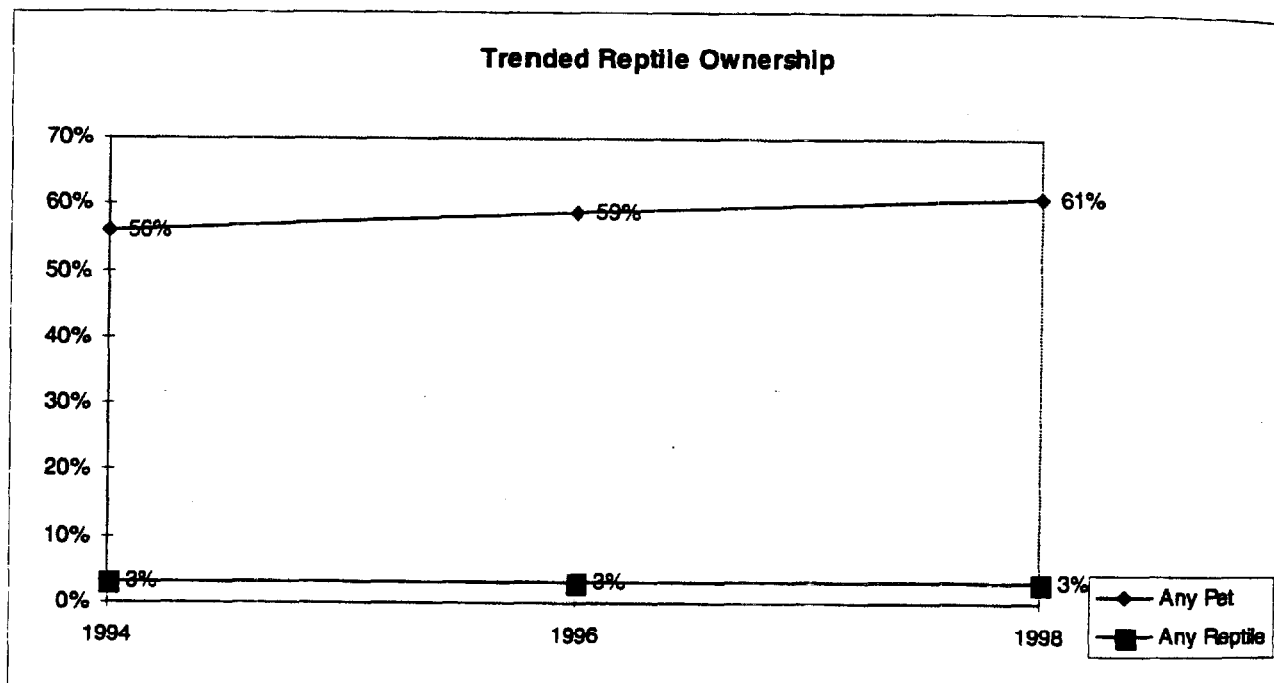
REPTILE OWNERSHIP

Close to three-out-of-100 U.S. households own a reptile or 2,710,800 households nationwide. This represents a 10% increase over 1996, which reported 2,460,000 households owning reptiles.

The incidence of pet ownership in the U.S. increased to 61% from 59% in 1996. On a household basis, 61,244,000 households currently own a pet up from 58,056,000 households in 1996. Current reptile incidence of ownership is essentially unchanged since 1994, currently at 3%. (On the chart below, the incidence of reptile ownership is rounded. Currently it is 2.7% up from 2.5% in 1996.) Among the total American pet owning households (61,244,000), 4.4% own a reptile.

The overall gain in pet ownership is attributable to increases in households owning dogs.

The graph on the next page details the types of reptiles owned.



Screener questionnaire April 1998. Other data on reptiles was not available prior to 1994.

NUMBER OF REPTILES OWNED

Overall, between two and three reptiles are owned per household. Households with three or more children own slightly more reptiles (between three and four) than households with one or two children (between two and three). Similarly, when a male is the primary product purchaser/caretaker, more reptiles are owned (four) than when a female is the primary caretaker (three).

Among multiple reptile owning households, an average of five reptiles are owned.

Of the reptile breeds listed below, each household owns an average of up to two.

Average Number of Reptiles Owned						
1998	Total Owners	Frog Owners	Lizard Owners	Snake Owners	Turtle/Tortoise Owners	Iguana Owners
Base: Total Reptile Owners	(153)	(37)*	(28)*	(32)*	(62)	(39)*
	%	%	%	%	%	%
# of Reptiles Owned:						
1	48	43	57	63	58	72
2	49	51	39	28	39	23
Average # Owned:	2.9**	2.4	1.8	1.6	2.5	1.6

* Small base size. Q. 2 b. **This average appears higher than the average of the five reptile types listed. However, it includes those reptiles not listed on the table due to small base sizes.

LENGTH OF TIME OWNED TYPE OF REPTILES /AMOUNT SPENT TO PURCHASE REPTILE

These reptile owners have been involved in the category for almost two years (twenty-two months). Turtle/tortoise owners have been involved in the category for the longest amount of time (twenty-seven months) while lizard owners have the shortest time in the category (seventeen months). Approximately one-quarter of all reptile owners have owned a reptile between one and six months.

The price to purchase a reptile range between \$15 for a frog and \$91 for a snake. The price paid excludes owners who received their reptile for free.

Number of Months Have Owned (Any) Reptile/Average Price Paid					
1998	Frog Owners	Turtle-Tortoise Owners	Iguana Owners	Snake Owners	Lizard Owners
Base: Total Reptile Owners	(37)*	(62)	(39)*	(32)*	(28)*
	%	%	%	%	%
* - 6 months	38	24	21	31	21
* - 12 months	19	11	23	16	21
* 3 - 24 months	19	18	18	3	36
25 - 36 months	5	11	21	16	7
37 - 48 months	3	7	8	13	4
49 - 60 months	5	8	-	9	4
61 + months	8	7	5	3	-
No answer/Don't know	3	14	4	9	7
Average # of Months owned:	21	27	21	24	17
Amount Spent to Purchase					
Reptile: \$	\$15	\$28	\$33	\$91	\$33

* Small base size. Q. 2c, Q. 4 (average cost excludes "0")

BENEFITS AND DRAWBACKS OF OWNING REPTILES

A key reason to own a reptile unchanged since 1996 is being *fun to watch/have in household/play with* mentioned by eight-out-of-ten reptile owners. Other benefits of ownership cited by more than six-out-of-ten owners include *quiet*, *convenience/easy to maintain* and a *conversation piece*. Four-out-of-ten further maintain benefits include the reptile being a *hobby*, *educational* and *good for teaching responsibility*. These benefits are fairly consistent with those reported in 1996 (among the common ones.)

While reptiles are easy to maintain, they are not as popular as small animals in terms of *teaching children responsibility*. In fact, only small animals are highly rated for this characteristic. The ability of reptiles to teach children responsibility (40%) is equal to that of dogs, both of which are higher than the level reported for cats and birds. Owners who have reptiles as a means of teaching children responsibility usually have two or more children under 18 years of age. However, few owners mentioned responsibility as a primary reason (6%) to own a reptile. A new reason offered in 1998 for owning a reptile, *like a child/family member*, is not a top ranked reason to own a reptile (20%) while other pets, including cats and dogs, are owned for this reason (seven-out-of-ten).

The leading primary benefit of reptile ownership mentioned by three-out-of-ten owners is *fun to watch/have in household/play with*. This benefit is eminently important among households with only one child. One-out-of-ten offered *convenience/easy to maintain* and *companionship* (the latter being mentioned by more lizard owners) as a primary benefit.

Four-out-of-ten reptile owners noted *sadness when they die* as a drawback to ownership. This level is lower than cats (52%), dogs (61%) or birds (49%) as an example. Other negatives associated with reptile ownership include *cleaning up* and *finding care when away from home*. *Sadness when they die* is a primary drawback of reptile ownership reported by two-out-of-ten owners.

Benefits and Drawbacks to Reptile Ownership

	1998 Total Reasons (153)	1996 Total Reasons (163)	1998 Primary Reasons (153)	1996 Primary Reasons (163)
Base: Total Reptile Owners				
Benefits:	%	%	%	%
Fun to watch, have in household/play with	76	88	28	36
Quiet*	73	NA	6	NA
Convenience, easy to maintain	67	71	17	17
Conversation piece*	58	NA	5	NA
Hobby	44	46	9	14
Educational*	43	NA	4	NA
Good for children, teach responsibility	40	49	6	18
Relaxation*	33	NA	1	NA
Companionship	32	24	10	6
They live a long time*	28	NA	1	NA
Like a child/family member	20	NA	4	NA
Good for health	10	6	1	0
Breed for money	3	NA	1	NA
Keeps undesirable animals away*	1	NA	-	NA
Appearance	NA	32	3	3
Drawbacks:				
Sadness when they die*	40	NA	18	0
Cleaning up	33	46	12	20
Finding care when away from home	30	37	10	18
Cost	20	22	8	8
Getting children to accept responsibility*	16	NA	7	NA
Care for food, care, medicine	18	17	11	14
Escape from cage*	13	NA	7	NA
Veterinarian not knowledgeable*	11	NA	3	NA
Bad around other pets*	6	NA	1	NA
Damage to furniture/carpets/property*	1	NA	-	NA

Q. 14a, 14b, 15a, 15b *New statements added for 1998 which may have affected other ratings. Ranking based on total 1998 column.

DEMOGRAPHIC PROFILE OF REPTILE OWNERS BY THE NUMBER OF REPTILES OWNED

1998	Total U.S. Sample (16, 958)	Total Owners (153)	Own 1 Reptile (73)	Own 2+ Reptiles (74)
Base: Total Reptile Owners				
Age of Respondent: # (US vs reptile owner)	%	%	%	%
< 25	4#	12	11	12
25 - 34	18	26	29	27
35 - 44	24	36	39	33
45 - 54	19	20	15	22
55 - 64	12	5	6	5
65+	22	1	-	1
Average Age:	47 yrs.	38 yrs.	37 yrs.	38 yrs.
Sex of Respondent:				
Male	NA	26	19	31
Female	NA	71	77	66
Marital Status:				
Married	57	62	70	58
Not Married	40	34	27	38
Household Size:				
1	26	9	8	10
2	33	24	25	23
3	17	20	16	23
4 +	24	47	51	45
Home Ownership:				
Own	68	65	67	65
Rent	27	30	27	32
Type of Residence:				
House	71	70	77	68
Apartment	14	15	16	15
Mobile home	8	8	6	10
Condo/Twinplex	6	6	1	8
Household Income:				
Under \$15,000	21	18	18	18
\$15,000 - \$24,999	16	15	11	18
\$25,000 - \$34,999	14	13	15	11
\$35,000 - \$49,999	17	16	18	15
\$50,000 and over	31	38	38	39
Average Income: \$	\$34K	\$38K	\$40K	\$38K
Market Size (Population):				
2,500,000 and over	24	31	41	22
1,000,000 - 2,499,999	24	22	16	27
500,000 - 999,999	9	11	7	15
250,000 - 499,999	11	9	7	10
50,000 - 249,999	10	12	14	8
Non-MSA	22	16	15	19
Geographic Region:				
New England	4	5	6	4
Middle Atlantic	16	18	16	18
East North Central	18	18	21	15
West North Central	8	6	6	7
South Atlantic	18	18	25	14
East South Central	6	3	4	3
West South Central	10	11	7	14
Mountain	6	6	7	7
Pacific	13	14	10	20
Presence of Children:				
Have Children < 18 years of age	35	60	62	60
No Children < 18 years of age	65	40	38	40

Q. Demographics Total may not equal 100% due to rounding or no response.

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Salmonella*All tables will open in a new window.***1999****Quarterly Reports (PRELIMINARY DATA)**

- **1st Quarter**
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- **2nd Quarter**
[Table 1](#) | [Table 2](#) | [Table 3](#)
- **3rd Quarter**
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TABLE 1
THE 20 MOST FREQUENTLY REPORTED SALMONELLA SEROTYPES
FROM HUMAN SOURCES REPORTED TO CDC IN 1998 AND FROM
NONHUMAN SOURCES REPORTED TO CDC AND USDA IN 1997

HUMAN 1998				NONHUMAN 1997			
RANK	SEROTYPE	NUMBER	PERCENT	RANK	SEROTYPE	NUMBER	PERCENT
1	TYPHIMURIUM *	8777	26.0	1	TYPHIMURIUM *	3717	20.8
2	ENTERITIDIS	5900	17.5	2	HEIDELBERG	1916	10.7
3	NEWPORT	2266	6.7	3	KENTUCKY	939	5.3
4	HEIDELBERG	1894	5.6	4	ANATUM	756	4.2
5	JAVIANA	1165	3.5	5	DERBY	670	3.8
6	AGONA	988	2.9	6	AGONA	652	3.7
7	MONTEVIDEO	823	2.4	7	SENFTEMBERG	648	3.6
8	ORANIENBURG	690	2.0	8	HADAR	631	3.5
9	MUENCHEN	638	1.9	9	DUBLIN	615	3.4
10	INFANTIS	590	1.8	10	MBANDAKA	599	3.4
11	THOMPSON	561	1.7	11	ENTERITIDIS	564	3.2
12	HADAR	541	1.6	12	BREDENEY	463	2.6
13	BRAENDERUP	496	1.5	13	MONTEVIDEO	450	2.5
14	SAINTPAUL	476	1.4	14	CHOLERAESUIS **	396	2.2
15	TYPHI	382	1.1	15	INFANTIS	389	2.2
16	POONA	341	1.0	16	MUENSTER	334	1.9
17	MISSISSIPPI	314	0.9	17	SCHWARZENGRUND	272	1.5
18	JAVA	248	0.7	18	WORTHINGTON	249	1.4
19	STANLEY	192	0.6	19	SAINTPAUL	219	1.2
20	PARATYPHI B	189	0.6	20	OHIO	197	1.1
SUB TOTAL		27471	81.5			14676	82.3
TOTAL		33704				17829	

* TYPHIMURIUM INCLUDES VAR. COPENHAGEN

** CHOLERAESUIS INCLUDES VAR. KUNZENDORF

TABLE 2
SALMONELLA ISOLATIONS FROM HUMAN SOURCES
BY SEROTYPE, AGE AND SEX, 1998

	SEX			TOTAL
	FEMALE	MALE	UNKNOWN	
AGEGROUP				
< 1 YR	1482	1666	153	3301
1 TO 4 YRS	2399	2502	184	5085
5 TO 9 YRS	1218	1419	70	2707
10 TO 19 YRS	1300	1539	70	2909
20 TO 29 YRS	1651	1465	74	3190
30 TO 39 YRS	1603	1375	90	3068
40 TO 49 YRS	1357	1137	48	2542
50 TO 59 YRS	1074	736	46	1856
60 TO 69 YRS	860	598	37	1495
70 TO 79 YRS	769	513	41	1323
80+ YEARS	613	327	23	963
UNKNOWN AGE	2171	2031	1063	5265
TOTAL	16497	15308	1899	33704

TABLE 3
SALMONELLA ISOLATIONS FROM HUMAN SOURCES
BY SEROTYPE AND YEAR, 1988-1998

SEROTYPE	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
AARHUS				1	4	13	6		6	16	9	55
ABA				1								1
ABAETETUBA	1	2	5	3	1	2	10	10	17	8	7	66
ABERDEEN	6	5	2	3	3	5	1	5	2	3	4	39
ABONY	5	12	3	4	2	3	6	9	2	3	6	55
ABORTUSBOVIS	1						1					2
ABORTUSEQUI										1		1
ACRES									1			1
ADELAIDE	76	62	64	61	96	74	110	98	88	70	72	871
AEQUATORIA										1		1
AFLAO									1			1
AFRICANA											2	2
AGAMA			1	1	1		4	3	2	2	2	16
AGBENI	4		1	2	3	1	3	5	1	3		23
AGEGE		1							1			2
AGO								1		1	1	3
AGONA	1121	925	980	1006	750	651	753	683	606	740	988	9203
AGOEVE		1			1		2	2	4	3	6	19
AHMADI				1								1
AHUZA									1			1
AJIOBO						1				2	2	5
ALABAMA	7	2	1		3		1	1	2	2	2	21
ALACHUA	69	47	48	16	28	55	70	52	39	18	14	456
ALAGBON		1										1
ALAMO						2		1			1	4
ALBANY	47	56	42	23	24	30	29	49	26	21	23	370
ALBERT			1				2	1	1			5
ALBUQUERQUE		1				1						2
ALGER	1											1
ALLANDALE											1	1

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
ALTENDORF				1								1
ALTONA				1			1		1	1		4
AMAGER		1	1	1	3	2		6	1	8	3	26
AMERSFOORT					1							1
AMSTERDAM	7	15	4	2	3	3	4	11	2	9	5	65
ANATUM	266	228	285	232	158	194	146	174	271	208	138	2300
ANECHO	1	2	5	1	1	2		2	5	2	2	23
ANK							1		2			3
ANNEDAL									1			1
ANTONIO			1	1								2
ANTSALOVA							1	2	1		2	6
APAPA										2		2
AQUA				1	1	1		3	2	1		9
ARAGUA									1	1	1	3
ARECHAVALETA	1	1		5	4	1	4	6	6	9	4	41
ARGENTINA					1							1
ARKANSAS	3	6	12	6	1					1	2	31
ASHANTI				1								1
ASSEN		1	2									3
ASSINIE						1						1
ATHINAI											1	1
AUGUSTENBORG		1	2	2		1				2		8
AVIGNON			1				1					2
AZTECA	1	1	1			1						4
BABELSBERG			1									1
BAGUIDA						1						1
BAHATI									1			1
BAHRENFELD						1				1		2
BAILDON	1	2		1	1	1	1	14	5	5	73	104
BALL			1						2			3

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
BANANA				1	1	1			1	1	1	6
BANCO											2	2
BARDO	32	24	33	11	4	8	8	1	28	10	9	168
BAREILLY	152	148	111	117	94	105	83	109	115	112	153	1299
BARRANQUILLA									1			1
BAZENHEID	1											1
BELEM				3	1							4
BELFAST				1								1
BENFICA			1					2	1		1	5
BENIN							1		1			2
BERE	6			3	1	1	2	1	1	8	1	24
BERGEDORF	2											2
BERKELEY	1										1	2
BERLIN						1						1
BERN	1											1
BERTA	497	653	487	419	333	401	399	367	118	87	123	3884
BIETRI	2											2
BINZA	3		2	5	1	1	2	1			1	16
BIRKENHEAD	2						2		2	7	4	17
BISPEBJERG									1	1		2
BLEGDAM		1	2	5	2	6	6		2	4	3	31
BLIJDORP									1			1
BLOCKLEY	476	262	147	132	86	89	76	55	51	62	60	1496
BLUKWA									1	1		2
BOCHUM											5	5
BONAIRE		1	1		1	1		1	1			6
BONAMES			2									2
BONARIENSIS	1	4		9	4	6		5	3	3	6	41
BONGOR								1	1			2
BONN	2	2	2				7	4	1		1	19

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
BORBECK								1				1
BORNUM					1							1
BOVISMORBIFICANS	46	73	40	36	26	35	40	25	41	47	63	472

BRADFORD	4	2	1	2	54	44	35	12	1	3	1	159
BRAENDERUP	636	745	758	411	477	381	426	588	531	559	496	6008
BRANCASTER											1	1
BRANDENBURG	186	195	176	161	188	257	259	284	181	167	132	2186
BRAZIL				1		2		1	1	1		6
BRAZOS										1		1
BRAZZAVILLE				1								1
BREDA						1						1
BREDENEY	117	99	87	75	57	49	44	57	47	51	112	795
BREFET						1						1
BREZANY							1					1
BRIKAMA						1			1			2
BRISTOL										1		1
BRON							2	2	1			5
BRONX							1			2	2	5
BROUGHTON	1							2				3
BRUNEI			1	1								2
BUDAPEST						1		1				2
BUKAVU										1		1
BUKURU	1											1
BURGAS				1								1
BURUNDI								1				1
BUTANTAN	1											1
BUZU							1	3		5	4	13
CALABAR											1	1
CALIFORNIA	2		1	6	2	4	2	1	1	9	3	31
CAMBERWELL											1	1

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
CAMBRIDGE	1	1						1				3
CANADA		1							1			2
CANASTEL			1									1
CANNSTATT										1	1	2
CANOGA	1		1	2	28	1						33
CARACAS										3		3
CARMEL								1	1			2
CARNO			1									1
CARRAU	2	1	9	6	5	9	9	12	30	6	3	92
CARSWELL				1	1							2
CERRO	139	117	115	102	99	57	62	74	55	60	50	930

CHAILEY	2	2	4	2		1		6	4	12	9	42
CHAMELEON	1	1	1	2	3	9	9	12	11	7	8	64
CHAMPAIGN			1				1	1				3
CHANDANS							1					1
CHARITY			1	1		1						3
CHARLOTTENBURG				1					1			2
CHESTER	42	22	369	27	30	23	21	34	26	36	23	653
CHICAGO						1	1				1	3
CHINCOL			1	1	1	2					1	6
CHINGOLA										1		1
CHITTAGONG		2										2
CHOLERAESUIS	57	50	39	40	35	50	53	50	41	25	23	463
CHOLERAESUIS VAR KUN	49	42	34	42	56	36	18	25	26	24	13	365
CLACKAMAS	1		3		1		1	1	1	3		11
CLAIBORNEI				1							1	2
CLERKENWELL			1									1
COELN	4	2	3	5	1	4	2	2	7	4	5	39
COLEYPARK		2	1		2							5
COLINDALE	2		1				5	2	7	1	4	22

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
COLORADO				1	1	1	1	1	1	1	2	9
CONCORD		1	1	1			1	4	5	2	2	17
CORVALLIS		1	1	1	1	2		1	1	1	1	10
COTHAM							1					1
CREMIEU										1		1
CUBANA	26	20	21	29	32	32	61	44	34	36	71	406
CULLINGWORTH									1			1
CURACAO	2	1		1		1	1					6
DAKOTA	1											1
DAYTONA	1	2	2	3	1	5	3	3	4	6	3	33
DECATUR			1	3		1	1				2	8
DEGANIA								1				1
DENVER	2	6	2	4	1	9	2	5	2	3	1	37
DERBY	340	289	268	184	199	170	144	213	143	152	171	2273
DESSAU		2	2							1		5
DIBRA	1											1
DIGUEL									4	2	1	7
DJAKARTA						2						2

DJUGU		1	2	3	2		4	1	2	2	1	18
DOBA							1	1				2
DOEL									2			2
DOULASSAME				1						1	1	3
DRIFFIELD	1											1
DROGANA					3		1	3				7
DRYPOOL	15	8	5	7		4	4	8	5	7	4	67
DUBLIN	92	121	103	106	100	90	65	81	85	61	78	982
DUESSELDORF	8	13	14	10	6	19	12	13	6	6	15	122
DUGBE							1					1
DUISBURG		1	1	1	1			2				6
DUMFRIES			1									1

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
DURBAN	4	7		5	2	4	11	3	8	8	10	62
DURHAM		2		5	3	1	5	6	4	2		28
DUVAL					1	2		1		1	1	6
EALING				4	2	2	8	24	26	8	6	80
EASTBOURNE	15	11	2	11	5	8	13	10	13	3	8	99
EDINBURG	5	14	1	4		1	3	4			1	33
EDMONTON			1									1
EILBECK								1				1
EIMSBUETTEL	1	2										3
EKO			1	4	2							7
EKPOUI				1		1						2
EMEK	2	2	4	7	7	4	3	6	5	7	7	54
EMMASTAD	1											1
ENSCHEDÉ					1							1
ENTEBBE					1		2		8	4		15
ENTERITIDIS	7063	8466	8734	7755	6578	8071	9866	10201	9570	7924	5900	90128
ENUGU								1	1	1		3
EPPENDORF			1			1	1					3
ERLANGEN				1								1
ESCANABA	1									3		4
ESSEN	1	1	1	3	3		3		2	3	2	19
ETTERBEEK										1		1
FALKENSEE	1		1	1			1	2		1		7
FALLOWFIELD										3		3

FARMSSEN				1	1		3	2	2	6	4	19
FAYED								1				1
FERRUCH		1										1
FINKENWERDER			1									1
FISCHERKIETZ			1								1	2
FLINT	7		5	29	20	30	32	39	34	43	54	293

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
FLORIDA	1	2	3	9		5	3	2	7	11	8	51
FLUNTERN									1		3	4
FORTLAMY								2				2
FREEFALLS								2				2
FREIBURG						1						1
FREMANTLE								1				1
FRESNO							1	1				2
FRIEDENAU										1		1
FRINTROP									1			1
FULICA										1		1
FYRIS	3	2	3	1					2		1	12
GABON											1	1
GALIEMA	1	1		3								5
GALIL								1		1		2
GALLINARUM		1	1	1					2		1	6
GAMABA											1	1
GAMBIA								1		2		3
GAMINARA	41	43	41	50	38	37	38	45	44	47	60	484
GARBA				1					1			2
GAROLI				1		1						2
GATESHEAD						3						3
GATOW	3	1	2	1	2	1		1			2	13
GATUNI	7	4	6	3	2	6	3	1	2		1	35
GEORGIA			2				1	2			2	7
GERA				1	1							2
GIVE	82	86	94	143	123	101	95	101	114	118	92	1149
GLIDJI									1			1
GLOSTRUP	14	16	26	17	78	42	13	31	13	5	10	265
GLOUCESTER						2	3	2	2	2		11
GODESBERG			1			1		1	1			4

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
GOETEBORG										1		1
GOETTINGEN	1		1	2	2	1				1	1	9
GOLDCOAST			1					1		1	1	4
GOMBE			1									1
GOODWOOD			1									1
GROUP 51					1				1	1	2	5
GROUP 52									2			2
GROUP 53							2	1	5	3	2	13
GROUP 54								1				1
GROUP 56									3	1		4
GROUP 57											1	1
GROUP 58						3		3		3	1	10
GROUP 59						1	2			1		4
GROUP 60							3	2	6	3	2	16
GROUP 61					2	9	11	17	17	6	4	66
GROUP 64						1						1
GROUP 65							1	2	2	6		11
GROUP A	3	4	13	6	1	1	7	4	3	1	2	45
GROUP B	624	434	495	370	475	539	563	601	582	507	523	5713
GROUP C1	200	151	168	112	124	110	137	108	123	103	85	1421
GROUP C2	150	116	99	60	107	163	201	111	108	64	50	1229
GROUP D1	221	211	209	155	202	280	257	182	186	116	113	2132
GROUP D2			1		1			1	3	2	1	9
GROUP D3											2	2
GROUP E1	13	18	20	13	13	7	29	20	21	13	14	181
GROUP E2		1		1					2	4	2	10
GROUP E4	1	3	2	1	2	2	3	2	3	2	3	24
GROUP F	1	1		2	7	2	8	3	5	2	6	37
GROUP G	52	23	17	9	7	22	34	73	42	8	17	304
GROUP H	10	2	1	2	1	3	2	2	4		2	29

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
GROUP I	2		1	2	3	2	12	5	6	5	44	82
GROUP J						2		1	1			4
GROUP K	1			2	6	1	2	3	5	2	4	26
GROUP L					1		3	2		1	1	8
GROUP M										2		2
GROUP N					1	1			1		1	4
GROUP O	2	1	1	2			3	2	3	2	1	17
GROUP P	1			1		11	4	4	1	4	1	27
GROUP Q								1		1	1	3
GROUP R					4	2	1	2	3		3	15
GROUP S						3	5	5	5	5		23
GROUP T									1	1		2
GROUP U						2	2	3	4	1		12
GROUP V	1				2	1	6	15	26	33	9	93
GROUP W					2	13	24	15	21	10	3	88
GROUP X					2	1	1	1	10	9	2	26
GROUP Y					6	14	14	15	15	11	4	79
GROUP Z					5	16	18	18	16	13	6	92
GRUMPENSIS	1	1	2	1		3	1	3			1	13
GUARAPIRANGA			1									1
GUINEA									1			1
HAARDT	77	75	49	22	10	13	10	16	6	5	2	285
HADAR	2442	2007	1837	1970	1532	1298	1001	812	658	643	541	14741
HADDON								1				1
HAELSINGBORG					1	1						2
HAGENBECK					2			1	1	1		5
HAIFA	4	3	8	4	2	4	2	2	3	4	3	39
HALMSTAD			1		1		3		1			6
HAMBURG	56	16	7	2				4		1		86
HANDEN									1			1

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
HARBURG										1		1
HARLEYSTREET											1	1
HARRISONBURG			1									1
HARTFORD	58	49	56	130	71	100	90	164	89	110	175	1092
HATFIELD										1		1
HATO	2	2	15				1	1				21
HAVANA	68	80	57	56	49	53	38	57	59	47	77	641
HAYINDOGO											1	1
HEERLEN							1					1
HEIDELBERG	5167	4722	3955	2972	2528	2457	1825	2095	1998	2104	1894	31717
HEILBRON					3	1					1	5
HERON										1		1
HERSTON					1	1						2
HIDALGO		2				1	1			1		5
HIDUDDIFY				4			1				3	8
HILLINGDON									1			1
HINDMARSH			3	1	1	1		2	1	1	3	13
HISSAR	1											1
HOLCOMB			2	1					1	2		6
HOMOSASSA									1		2	3
HORSHAM	1		1	1	1				2			6
HOUTEN	3	4	3	2	5	3	7	3	21	1	6	58
HULL			1			1	1	3				6
HVITTINGFOSS	11	10	10	11	22	20	14	15	44	26	28	211
HYDRA			1									1
I 4,5,12:I:-											31	31
IBADAN	14	7	19	21	20	13	24	46	33	42	39	278
IDIKAN				5	6	6	2		11	4	1	35
II 50:B:Z6											2	2
IIIB 61:1,V:1,5,7											1	1

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
ILALA										1		1
ILLINOIS		1		1					1			3
ILUGUN									3			3
IMO									1			1
INCHPARK							1					1
INDIA				1	1				1			3
INDIANA	94	78	48	36	24	18	25	24	28	11	7	393
INFANTIS	1003	908	753	580	499	568	520	521	503	651	590	7096
INGANDA	1				1							2
INPRAW					1							1
INVERNESS	17	25	16	15	32	20	21	37	20	26	32	261
IPSWICH				1				1	1			3
IRCHEL								1				1
IRUMU	2	6	2	1	7	39	45	31	18	13	15	179
ISANGI	2	5	1	2				3	1	1	5	20
ISLINGTON							1					1
ISRAEL					1							1
ISTANBUL	29	26	21	5	13	12	7	10	9	8	7	147
ITAMI	2	2		2			1		1	2	8	18
ITURI					1	5	2	4	2	1	5	20
IV 44:Z4,Z23:-										4	6	10
IV 45:G,Z51:-											2	2
JACKSONVILLE		3										3
JAFFNA						1	2					3
JAJA										1		1
JAMAICA				2	2	1	2	6		2	1	16
JANGWANI	1			5	2	6	3	10	7	4	5	43
JAVA	205	193	120	148	156	176	172	268	289	184	248	2159
JAVIANA	424	578	703	786	648	641	540	758	749	675	1165	7667
JEDBURGH					1					1		2

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
JERICO			1									1
JERUSALEM	1		1		1							3
JOAL									1			1
JODHPUR											1	1
JOHANNESBURG	92	61	78	108	53	63	48	74	44	44	32	697
JUBILEE										1		1
JUKESTOWN					1							1
KAAPSTAD			4	8	3				1			16
KADUNA						1	1					2
KALAMU					1							1
KAMBOLE											1	1
KAMPALA			1									1
KANIFING		1		5		3				1		10
KAOLACK									1			1
KEDOUGOU				1				4			1	6
KENTUCKY	61	56	47	46	31	46	42	80	78	60	58	605
KIAMBU		13	21	11	4	7	6	14	17	14	13	120
KIBI						1						1
KIBUSI			1						3			4
KILWA							11	4	2		1	18
KIMBERLEY			1									1
KIMUENZA				3			2					5
KINGABWA					1	1	1	1		2		6
KINGSTON	3	2		4	1	1	1			3	1	16
KINONDONI					1				1	1	1	4
KINSHASA	2	1					2	4	7	6	1	23
KINTAMBO		2	3	1	2	17	19	21	19	14	20	118
KIRKEE										1		1
KISANGANI		1			1			2				4
KISARAWA						1				2	2	5

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
KISII				1								1
KITENGE								1				1
KODJOVI				2			1					3

KOESSEN									1			1
KOKETIME	1								1			2
KOKOLI											1	1
KOKOMLEMLE		5	2	2	1	2	2	2	2	3	1	22
KONSTANZ			1									1
KORTRIJK				1								1
KOTTBUS	23	7	18	21	42	27	22	49	9	11	2	231
KPEME						1						1
KRALENDYK			1	4	5	5	3	10	15	4	14	61
KREFELD	5	2	1	1	1	9	3	3	2	1		28
KUA					1	1	1	2	1	1	1	8
KUILSRIVIER			2									2
KUMASI							1					1
KUNDUCHI											1	1
KURU							1					1
LABADI					1		1	2			1	5
LAGOS	1	3			3	1	1	2	1	1		13
LAMBERHURST											1	1
LAMIN											1	1
LANDAU										1		1
LANDWASSER						1					1	2
LANGENSALZA									1		1	2
LANKA	7	8	6		1	1	3				1	27
LANSING	1		1			1						3
LAROCHELLE	3	5	2	5	2	3	4	4	4	1	6	39
LAWNDALE	1					1			1			3
LAWRA					1							1

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
LEOBEN					1							1
LEOPOLDVILLE			1									1
LEXINGTON	4	2	5	1	3	5	3	1	2	1		27
LICHTENBERG					1							1
LILLE	1	1	4	2	4	3	1			3		19
LIMBE						1		1		1		3
LIMETE				1	1				1	6	1	10
LINDENBURG	17	12	12	12	8	11	6	9	5	3	10	105
LINDI									1			1

LITCHFIELD	172	117	80	94	92	116	93	115	158	105	119	1261
LIVERPOOL	1	2	3	6	6	1		2	3	3		27
LIVINGSTONE	34	52	35	22	27	12	16	13	18	6	4	239
LOANDA				7	3	3				1		14
LOCKLEAZE					1		3	2			1	7
LOHBRUEGGE		1						2	4			7
LOMALINDA	8	8	5	6	10	14	15	15	24	12	16	133
LOME						1	2		2	2		7
LOMITA	2	5	5	3	1	5	1	2	5	3	3	35
LOMNAVA				2								2
LONDON	60	52	40	19	21	14	15	36	23	33	28	341
LOSANGELES									1			1
LOVELACE							1				1	2
LUCIANA			4	2	1		4		1	3	3	18
LUKE							2					2
MAARSEN						1						1
MADELIA	5	5	12	8	10	3	5	8	21	7	12	96
MAGWA										1	1	2
MAIDUGURI										1		1
MAKUMIRA							1					1
MALSTATT		1							2			3

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
MAMPEZA									1			1
MANCHESTER		2	1									3
MANGO				1								1
MANHATTAN	106	69	50	36	49	130	92	72	101	99	73	877
MANILA		1	1				1					3
MAPO					1	1		1				3
MARACAIBO	1	2										3
MARICOPA					1							1
* MARINA	3	2	5	10	17	30	53	75	81	36	47	359
MARYLAND										1	1	2
MATADI			1	2		6	20	10	27	9	4	79
MATOPENI											2	2
MBANDAKA	262	190	135	206	130	167	118	154	223	189	146	1920
MELEAGRIDIS	10	6	18	25	8	15	12	30	207	43	36	410
MEMPHIS				1		2			1	1		5

MENDEN			1									1
MENDOZA	1			1	1		1			1	3	8
MENHADEN	8	2	4	1	5		2	5	14	1		42
MENSTON				2	2					1		5
MGULANI									2			2
MIAMI	21	41	28	115	70	98	126	74	52	76	99	800
MICHIGAN		1	1	1			3	8	1		2	17
MIDWAY				1	1							2
MIKAWASIMA	2	5	8	2	7	2	1	7		2		36
MINNEAPOLIS	5	18	6	7	4	1			1			42
MINNESOTA	13	12	22	21	19	28	13	36	28	26	17	235
MISSION	2						1					3
MISSISSIPPI	114	136	175	170	137	156	152	199	180	205	314	1938
MOERO								2				2
MOLADE	5		1	1	1	1	1			1	1	12

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
MONO							1	1			2	4
MONS			2	1					2			5
MONSCHAUI	3	5	6	2	9	8	9	9	11	10	3	75
MONTEVIDEO	788	794	928	868	559	789	631	685	1227	718	823	8810
MOREHEAD					1	1	1	2				5
MOROTAI			1									1
MOSCOW			2	1	15				1		4	23
MOUNTPLEASANT								1		1	1	3
MOWANJUM							1		2			3
MPOUTO							1			1		2
MUENCHEN	511	451	464	506	449	657	559	754	595	543	638	6127
MUENSTER	65	51	86	68	47	69	100	87	96	73	68	810
MUNDSBURG				1								1
NACHSHONIM									1			1
NAGOYA							1			1		2
NAMIBIA			1						1			2
NAPOLI				1					1			2
NARASHINO						1		1	1	1		4
NCHANGA	1										1	2
NDOLO						1						1
NEGEV							1	1				2

NESSZIONA										4		4
NEUDORF						1						1
NEWBRUNSWICK	11	17	22	8	8	5	3	20	22	26	36	178
NEWHAW	2	2						4	1	1	1	11
NEWINGTON	12	21	14	26	25	15	13	17	16	20	25	204
NEWLANDS									1			1
NEWMEXICO		2	1		1	3	2			1		10
NEWPORT	2901	2111	1802	1818	1481	1487	1673	2566	1985	1584	2266	21674
NEWROCHELLE								2	1	1	1	5

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
NEWYORK									3	4		7
NGILI							1					1
NIAKHAR					1							1
NIENSTEDTEN	1	1		3		1	2					8
NIGERIA	1								1			2
NIMA			1				1	1	4	1	5	13
NITRA		1							3			4
NOLA									1	1		2
NOORDHOEK								1				1
NORWICH	49	49	58	32	41	59	98	51	52	56	67	612
NOTTINGHAM				2	1	1	3	3	3	5	2	20
OAKLAND	1	2	3	2	2	3	4	1	4			22
OCHIOGU						1						1
OCHSENZOLL							1			2		3
OERLIKON							1					1
OFFA					2	1						3
OHIO	281	153	166	132	161	132	101	105	67	100	74	1472
OKATIE						1		1	1			3
OLDENBURG	1					1					1	3
ONARIMON	1											1
ONDERSTEPSOORT	2	1						1	2			6
ONIREKE			1				1	1				3
ONTARIO						2						2
ORANIENBURG	632	572	501	655	597	522	602	595	690	623	690	6679
ORDONEZ	1											1
ORIENTALIS								2	6		1	9
ORION	2	5	1		4	3	1	1	6	3	1	27

ORITAMERIN	1		1	3	1							6
OSLO	24	8	16	11	14	19	14	13	31	25	31	206
OTHMARSCHEN	1	4		6			4	2	6	6	7	36

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
OUAKAM		1			2	7	2	4				16
ODWIJK											1	1
OVERSCHIE						1		3	4	3	3	14
OYONNAX				1								1
PAKISTAN	4	5	1	2		1			2	4		19
PANAMA	264	266	304	236	185	173	163	173	148	144	117	2173
PAPUANA					1			1		1		3
PARATYPHI A	86	69	69	76	80	53	79	86	86	72	85	841
PARATYPHI B	126	114	89	101	110	208	228	241	298	159	189	1863
PARATYPHI C	2	5	2	1	2	1	2	2	1	1		19
PARERA	1				2	2	4	7	7	2	4	29
PARIS			1									1
PATIENCE									1			1
PENSACOLA	6	4	4	7		8	3	11	4	7	5	59
PHARR			1	1								2
PHOENIX	1	8	5	1		8	3	9	9	5	4	53
PLANCKENDAEL										1		1
PLYMOUTH				1	1			1	1			4
POANO					1	2	6	2	5			16
POMONA	2	6	4	10	9	7	6	23	29	43	18	157
POONA	124	199	126	788	218	295	376	531	415	293	341	3706
PORTLAND	1	1	1			2						5
PORTSMOUTH		2	6	1	1	1	3	1	1	4	2	22
POTSDAM	10	14	6	7	8	8	6	5	3	10	6	83
PRAHA	1			3	2	1	3	1				11
PRESTON				1		1						2
PULLORUM	1	1	1							1		4
PUTTEN	1		1	4	1	1	1	8	6	5	9	37
QUEBEC											1	1
QUIMBAMBA								3				3

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
QUINIELA		1	1	1	1		2			1	1	8
RAMATGAN		1					1					2
RAUS			1	2	2		1	2	3		3	14
READING	128	231	397	396	430	363	257	197	131	167	80	2777
REDLANDS				1	1				1	1		4
REGENT								2				2
REMO	3	1				2		1	2		1	10
RHODESIENSE		1	2									3
RHONE			1									1
RICHMOND	1	6	4	6	4	4	3	7	6	7	4	52
RIED	1											1
RIOGRANDE	1	1		1	1			1				5
RISSSEN	3				4	6	10	4	5	9	6	47
ROMANBY						1		5	5	4	1	16
ROODEPOORT										1	2	3
ROSTOCK		2							1			3
ROTTERBERG		2				1	1	1	2		1	8
ROVANIEMI				1								1
RUBISLAW	50	58	65	83	67	58	77	83	71	81	88	781
RUIRU	1				1							2
SAARBRUECKEN											1	1
SABOYA											1	1
SADA				1								1
SAINTPAUL	650	509	558	439	529	380	479	467	562	436	476	5485
SAKA					3							3
SAKARAH											1	1
SALINATIS	3	3		2	2		1	3	3			17
SANDIEGO	95	71	88	105	100	92	82	117	56	59	53	918
SANDOW					3	1	2					6
SANGALKAM		1		1								2

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
SANGERA							2	1				3
SANJUAN		2	1									3
SANTIAGO					2			1	1			4
SAO									1			1
SAPHRA	8	15	8	10	7	1	6	11	11	41	16	134
SARAJANE											1	1
SCHLEISSHEIM	1	5	2	3	3		1	5	9	6	8	43
SCHOENEBERG										1		1
SCHWARZENGRUND	136	137	110	108	145	169	167	162	157	144	123	1558
SCHWERIN									1			1
SCULCOATES											1	1
SELANDIA	1				1							2
SEMINOLE								1				1
SENDAI						3		1			2	6
SENEGAL			1									1
SENFTENBERG	154	119	131	140	150	126	130	91	167	180	141	1529
SEREMBAN	1					2			1	1		5
SERREKUNDA											1	1
SETUBAL									1			1
SHAMBA										1		1
SHANGANI									1			1
SHARON								1				1
SHIPLEY			2									2
SHOMRON									1			1
SHUBRA	1		6	5	2	3	3	9	2	3	4	38
SIEGBURG	2											2
SIMI								2				2
SIMSBURY					1							1
SINGAPORE	18	10	4	5	6	4	4	4	12	3	12	82
SINSTORF	1	1	2	1	1	2	1	9	4	8	1	31

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
SKANSEN		1						1			1	3
SOAHANINA			2		1	1	1	1		1		7
SOERENGA						2	1		6	1		10
SOESTERBERG	1					1						2
SOFIA											1	1
SOMONE		1		2		1	1		5	3	1	14
SOUMBEDIOUNE							4					4
SOUTHAMPTON	1				1							2
SOUTHBANK									1			1
STACHUS									1	3		4
STANLEY	58	93	109	131	136	143	217	481	200	164	192	1924
STANLEYVILLE	13	12	13	7	13	5	5	51	26	23	16	184
STELLINGEN							1	2		3	1	7
STENDAL								1				1
STERRENBOS							1	1				2
STEVENAGE			1									1
STIKLAND							1					1
STRASBOURG									1			1
SUBERU										1	1	2
SUBSPECIES I			1		4	2	23	26	32	22	72	182
SUBSPECIES II		2	1	12	5	10	9	7	22	8	5	81
SUBSPECIES III								1	3	4	1	9
SUBSPECIES IIIA	11	9	9	2	4	5	21	20	11	7	12	111
SUBSPECIES IIIA/IIIB	71	53	88	47	58	33	60	37	28	17	12	504
SUBSPECIES IIIB	12	6	15	16	9	19	21	26	13	10	7	154
SUBSPECIES IV			4	7	6	5	13	31	21	22	17	126
SUBSPECIES V							1	1				2
SUBSPECIES VI								1	1			2
SUNDSVALL	3	1	3	2	3	3	5	17	25	47	7	116
SUNNYCOVE					1							1

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
SYDNEY								1	4	1		6
TAKORADI	2		1	3	2	2		1	4	5	4	24
TAKSONY		1		1		2			5	1		10

TALLAHASSEE	4	1	5	6	3	8	2	6	5	18	8	66
TAMALE							1		2			3
TAMBACOUNDA						2		3		1	1	7
TAMBERMA						1						1
TANANARIVE								1				1
TANGER								1				1
TARSHYNE		2										2
TEDDINGTON			1	1								2
TEKO											1	1
TELAVIV								1			1	2
TELELKEBIR	1	6	2	1	5	5	8	4	13	12	26	83
TENNESSEE	236	295	158	113	98	133	156	112	96	31	62	1490
TEXAS	1								1			2
THIELALLEE		1										1
THOMASVILLE	2	1			4	1	2	1	1	2	2	16
THOMPSON	952	925	750	716	690	576	549	625	586	695	561	7625
TIENBA											1	1
TILENE							1	4	7	2		14
TOKOIN					1			3				4
TOOWONG										1		1
TOUCRA							2	3	3			8
TRACHAU					1					1		2
TRAVIS		2								1		3
TRURO				1								1
TSEVIE	1		1				1	1	1			5
TSHIONGWE	1	2	2	6	2	2	3	2	4			24
TUCSON		3	2		1	1	2	2	1	3		15

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
TUDU			1									1
TUINDORP	1		2			2		1	1	2	1	10
TYGERBERG						1		2	1			4
TYPHI	496	544	579	500	449	472	507	442	440	349	382	5160
TYPHIMURIUM	9716	8630	8510	8780	7720	8436	7972	9147	9002	8289	8059	94261
TYPHIMURIUM VAR COPE	183	276	307	215	230	307	393	555	499	827	718	4510
TYPHISUIS		1								3		4
TYRESOE		1							1			2
UCCLE									1	4	4	9
UGANDA	21	14	11	21	23	29	19	28	63	51	44	324
UGHELLI	1											1

ULLEVI										1		1
UMBILO	1	1										2
UNKNOWN	2246	2365	2566	2947	2136	1649	1469	952	673	382	522	17907
UPHILL									1			1
UPPSALA	2	1						1	1		1	6
URBANA	26	15	18	15	26	52	63	72	60	57	46	450
UZARAMO		1	1		3	1	1	5			3	15
VALDOSTA				1								1
VANCOUVER						1	3	1				5
VEJLE		3	1	1				2		2	1	10
VICTORIA				1	1		3	1	3	2	1	12
VIETNAM								1				1
VILVOORDE								1	2	1		4
VIRCHOW	93	96	97	64	72	57	54	60	67	71	64	795
VIRGINIA	20	28	14	5		2		7	7	2		85
VOLKSDORF						1	1		2			4
VOLKSMARSDORF		1										1
VRIDI								1				1
WA									1			1

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
WANDSWORTH	4	2	1	2	4	1	5	14	6	5		44
WANGATA		1	1	1	2	1	1	1		1	1	10
WARAL							1	1		1		3
WASHINGTON							1	2	1	3		7
WASSENAAR	2	1	3	3	11	16	19	28	18	14	6	121
WAYCROSS	1		1	2	4	3	2		4	4	2	23
WAYNE			1					2	1	1		5
WELIKADE		1					1			1	1	4
WELTEVREDEN	98	89	65	71	68	98	86	89	86	106	66	922
WENTWORTH			1			1						2
WERNIGERODE	1										3	4
WESLACO	2			1			1	1			2	7
WESTHAMPTON	1	2		5		1	2	3	6	5	3	28
WESTON				1								1
WESTPHALIA							1					1
WICHITA							1					1
WIDEMARSH	2		3	1					3	2		11
WIEN				2	3	4	3	1				13

WIL									1			1
WILLEMSTAD			1			1		1		1		4
WIPPRA				1				2				3
WISBECH									2			2
WORTHINGTON	80	76	66	61	56	41	44	50	58	48	38	618
YABA	1											1
YARRABAH									1			1
YEERONGPILLY									1			1
YORUBA											1	1
YOVOKOME	1											1
ZAIMAN								1				1
ZANZIBAR	1			1		1	3	2	2	2	1	13

	YEAR											TOTAL
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SEROTYPE												
ZERIFIN			1									1
ZONGO				1								1
TOTAL	45410	43321	42338	40443	34688	36917	37522	41222	39035	34608	33704	429208

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M M W R

MORBIDITY AND MORTALITY WEEKLY REPORT

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National Arthritis Month — May 1995

May is National Arthritis Month. During this month, nationwide educational activities are planned to increase awareness of arthritis. Additional information about arthritis and addresses of local chapters are available from the Arthritis Foundation, P.O. Box 7669, Atlanta, GA 30357; telephone (800) 283-7800 or (404) 872-7100.

Prevalence and Impact of Arthritis Among Women — United States, 1989–1991

Arthritis and other rheumatic conditions are among the most prevalent chronic conditions in the United States, affecting approximately 38 million persons (1). The self-reported prevalence of arthritis is greater among women than among men, and for women aged >45 years, arthritis is the leading cause of activity limitation (1,2). This report uses data from the National Health Interview Survey (NHIS) to provide estimates of the prevalence and impact of arthritis among women aged ≥15 years during 1989–1991, compares the prevalence estimates of arthritis to other chronic conditions affecting women during 1989–1991, and projects the prevalence of arthritis among women in 2020.

Prevalence and Impact Estimates

The NHIS is an annual national probability sample of the U.S. civilian, noninstitutionalized population (3). Estimates of the prevalence of arthritis were based on a one-sixth random sample of women aged ≥15 years during 1989–1991 (n=24,201 of 145,832) who answered questions about the presence of any musculoskeletal condition during the preceding 12 months and details about these conditions. Each condition was assigned a code from the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM). This analysis used the definition of arthritis, which included arthritis and other rheumatic conditions,* developed by the

*ICD-9-CM codes 95.6, 95.7, 98.5, 99.3, 136.1, 274, 277.2, 287.0, 344.6, 353.0, 354.0, 355.5, 357.1, 390, 391, 437.4, 443.0, 446, 447.6, 696.0, 710–716, 719.0, 719.2–719.9, 720–721, 725–727, 728.0–728.3, 728.6–728.9, 729.0–729.1, and 729.4.

Melanoma — Continued

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Reptile-Associated Salmonellosis — Selected States, 1994–1995

During 1994–1995, health departments in 13 states reported to CDC persons infected with unusual *Salmonella* serotypes in which the patients had direct or indirect contact with reptiles (i.e., lizards, snakes, or turtles). In many of those cases, the same serotype of *Salmonella* was isolated from patients and from reptiles with which they had had contact or a common contact. For some cases, infection resulted in invasive illness, such as sepsis and meningitis. This report summarizes clinical and epidemiologic information for six of these cases.

Connecticut. During January 1995, a 40-year-old man was hospitalized because of an acute illness characterized by constipation, lower back pain, chills, and fever. He reported having taken ranitidine and an antacid for symptoms of heartburn before onset of mild diarrhea 3 days before hospitalization. A blood culture yielded *Salmonella* serotype Wassenaar. A magnetic resonance image scan of the right sacrum suggested osteomyelitis. Ciprofloxacin therapy was initiated for presumed *Salmonella* osteomyelitis, and he was discharged after 14 days. All household contacts were asymptomatic. The family had purchased two iguanas (*Iguana iguana*) in October 1994; although the patient denied directly handling the iguanas, he reported having recently cleaned their aquarium. Stool samples obtained from both iguanas yielded *Salmonella* Wassenaar.

New Jersey. During September 1994, a 5-month-old girl was hospitalized because of an acute illness including vomiting, lethargy, and fever; on admission, she had a bulging fontanelle and stiff neck. Blood cultures and cerebrospinal fluid yielded *Salmonella* serotype Rubislaw. She was treated with intravenous ceftazidime for *Salmonella* sepsis and meningitis and discharged from the hospital after 10 days. Other members of the family were asymptomatic. The infant routinely was fed infant formula. Although the family did not own a reptile, the infant frequently stayed at a babysitter's house where an iguana was kept. Culture of a stool sample from the iguana yielded *Salmonella* Rubislaw. The infant was reported to have not touched the iguana; however, the iguana frequently was handled by the babysitter and other members of the babysitter's family. All members of the babysitter's family were asymptomatic, but stool cultures from two members, including a child who had frequently played with and fed the infant, yielded *Salmonella* Rubislaw.

Salmonellosis — Continued

New York. In December 1994, a 45-year-old man infected with human immunodeficiency virus was hospitalized because of weakness, nausea, vomiting, and diarrhea. His CD4+ T-lymphocyte count was <50 cells/ μ L. Cultures from blood and sputum samples yielded *Salmonella* serotype Illa 41:z4z23:- (*S. subspecies Arizonae*). He owned corn snakes and, until shortly before onset of illness, had worked at a pet store where he handled reptiles frequently. *Salmonella* sepsis was diagnosed, and he was treated with oral ciprofloxacin.

North Carolina. During December 1994, a 2-day-old boy born 8 weeks prematurely developed respiratory difficulties, had pneumothorax diagnosed, and was transferred to a referral hospital. Blood obtained at birth for culture had been negative, but a culture of blood obtained 9 days later because of an elevated white blood cell count yielded *Salmonella* serotype Kintambo. He was treated with intravenous ampicillin for *Salmonella* sepsis and was discharged from the hospital after 30 days. Eleven days after the positive culture was collected, *Salmonella* Kintambo was cultured from a blood sample obtained from a 12-day-old acutely ill boy who was born at 28 weeks' gestation and had shared a room at the referral hospital with the first infant. The second infant was treated with intravenous cefotaxime for *Salmonella* sepsis and was discharged after 44 days. Both infants had been in the hospital continuously from birth until onset of illness. The mother of the first infant reported having had a diarrheal illness 4 days before the birth of the infant; she frequently handled a savanna monitor lizard (*Varanus exanthematicus*) that the family had purchased in September 1994 and kept in a cage in the kitchen. Culture of a stool sample from the lizard yielded *Salmonella* Kintambo. The second family did not own a reptile.

Ohio. During January 1994, a 6-week-old boy was hospitalized because of diarrhea, stiff neck, and fever; culture of samples of blood and cerebrospinal fluid yielded *Salmonella* serotype Stanley. The infant was treated with intravenous cefotaxime for *Salmonella* sepsis and meningitis and discharged from the hospital after 56 days. He had been fed only formula and had not attended a child-care facility; household contacts were asymptomatic. The family had purchased a 4-inch water turtle in April 1993. A culture of stool from the turtle yielded *Salmonella* Stanley. Although the infant had not had contact with the turtle, other family members had had direct contact, and the turtle's food and water bowls were washed in the kitchen sink.

Pennsylvania. During October 1994, a 21-day-old girl was hospitalized because of an illness including vomiting, bloody diarrhea, and fever. She received empirical treatment with intravenous ampicillin. A culture of stool yielded *Salmonella* serotype Poona; she was discharged from the hospital after 11 days. Other members of the family were asymptomatic. The infant had been fed infant formula and had not attended a child-care center. The family owned an iguana, and culture of a stool sample from the iguana yielded *Salmonella* Poona. Although the infant did not have contact with the iguana, the iguana was handled frequently by her mother and other members of the family.

Additional investigations. In addition to the six states in this report, seven other states (California, Colorado, Florida, Illinois, Minnesota, Oregon, and Utah) have reported recent isolation of the same *Salmonella* serotype from samples obtained from patients and reptiles with which they had been in contact or associated. Several of these states issued press releases about the risk for acquiring salmonellosis from reptiles. In addition, some states have issued health alerts to pet stores to warn owners

Salmonellosis — Continued

and prospective owners about the risks for salmonellosis associated with contact with reptiles and to provide instructions about proper handling of reptiles; store owners have been asked to post the alert and provide copies to all persons purchasing a reptile.

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Editorial Note: For most of the cases described in this report, the identification of rare *Salmonella* serotypes in persons who had no other apparent exposures was linked to direct or indirect contact with a pet reptile from which the same serotype was isolated. In addition, these cases are consistent with previous reports indicating that direct contact with a reptile is not necessary for transmission of *Salmonella* (1,2). This report also illustrates the severe complications of *Salmonella* infection that can occur in young children, immunocompromised persons, and infants during the peripartum period.

Reptiles are popular as pets in the United States: an estimated 7.3 million pet reptiles are owned by approximately 3% of households (G. Mitchell, Pet Industry Joint Advisory Council, personal communication, 1995). Because the most popular reptiles species will not breed if closely confined, most reptiles are captured in the wild and imported. The number of reptiles imported into the United States has increased dramatically since 1986 and primarily reflects importation of iguanas (27,806 in 1986 to 798,405 in 1993) (M. Albert, Fish and Wildlife Service, U.S. Department of the Interior, personal communication, June, 1994).

A high proportion of reptiles are asymptomatic carriers of *Salmonella*. Fecal carriage rates can be more than 90% (3); attempts to eliminate *Salmonella* carriage in reptiles with antibiotics have been unsuccessful and have led to increased antibiotic resistance (1,4). A wide variety of *Salmonella* serotypes has been isolated from reptiles, including many that rarely are isolated from other animals (reptile-associated serotypes). Reptiles can become infected through transovarial transmission or direct contact with other infected reptiles or contaminated reptile feces. High rates of fecal carriage of *Salmonella* can be related to the eating of feces by hatchlings—a typical behavior for iguanas and other lizards—which can establish normal intestinal flora for hindgut fermentation (5).

During the early 1970s, small pet turtles were an important source of *Salmonella* infection in the United States; an estimated 4% of families owned turtles, and 14% of salmonellosis cases were attributed to exposure to turtles (6). In 1975, the Food and

Salmonellosis — Continued

Drug Administration prohibited the distribution and sale of turtles with a carapace <4 inches; many states prohibited the sale of such turtles. These measures resulted in the prevention of an estimated 100,000 cases of salmonellosis annually (6). However, since 1986, the popularity of iguanas and other reptiles that can transmit infection to humans has been paralleled by an increased incidence of *Salmonella* infections caused by reptile-associated serotypes (7).

Because young children are at increased risk for reptile-associated salmonellosis and severe complications (e.g., septicemia and meningitis) (7-9), reducing exposure of infants or children aged <5 years to reptiles is particularly important. The risks for transmission of *Salmonella* from reptiles to humans can be reduced by avoiding direct and indirect contact with reptiles (see box).

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Recommendations for Preventing Transmission of *Salmonella* From Reptiles to Humans

- Persons at increased risk for infection or serious complications of salmonellosis (e.g., pregnant women, children aged <5 years, and immunocompromised persons such as persons with AIDS) should avoid contact with reptiles.
- Reptiles should not be kept in child-care centers and may not be appropriate pets in households in which persons at increased risk for infection reside.
- Veterinarians and pet store owners should provide information to potential purchasers and owners of reptiles about the increased risk of acquiring salmonellosis from reptiles.
- Veterinarians and operators of pet stores should advise reptile owners always to wash their hands after handling reptiles and reptile cages.
- To prevent contamination of food-preparation areas (e.g., kitchens) and other selected sites, reptiles should be kept out of these areas—in particular, kitchen sinks should not be used to bathe reptiles or to wash reptile dishes, cages, or aquariums.

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MORBIDITY AND MORTALITY WEEKLY REPORT

- 1009 Reptile-Associated Salmonellosis — Selected States, 1996–1998
- 1013 Assessment of Laboratory Tests for Plasma Homocysteine — Selected Laboratories, July–September 1998
- 1015 Surveillance for Acute Pesticide-Related Illness During the Medfly Eradication Program — Florida, 1998

Reptile-Associated Salmonellosis — Selected States, 1996–1998

During 1996–1998, CDC received reports from approximately 16 state health departments of *Salmonella* infections in persons who had direct or indirect contact with reptiles (i.e., lizards, snakes, or turtles). *Salmonella* infection can result in invasive illness including sepsis and meningitis, particularly in infants. Despite educational efforts, some reptile owners remain unaware that reptiles place them and their children at risk for salmonellosis. This report summarizes clinical and epidemiologic information in four cases and provides information about state regulations to prevent transmission of *Salmonella* spp. from reptiles to humans.

Case Reports

Arizona. During October 1996, a 3-week-old boy was admitted to a hospital emergency department with fever (103.6 F [40 C]), vomiting, and bloody diarrhea of 15 days' duration. Stool and blood cultures yielded *Salmonella* serotype IV 44:z4,z23-, an extremely rare serotype. The infant was hospitalized for 10 days and treated with intravenous fluids and amoxicillin. To determine the cause of the infant's illness, a stool specimen was obtained from the family's pet iguana, which also yielded *Salmonella* IV 44:z4,z23-. In an attempt to prevent reinfection, local health officials informed the parents of the importance of the infant avoiding direct and indirect contact with the reptile, and the iguana was moved to a relative's home. One month later, the infant spent 2 days in the relative's home where the iguana was housed; 48 hours after this visit, the infant was again treated at an emergency department for fever and diarrhea. A stool culture again yielded *Salmonella* IV 44:z4,z23-.

Kansas. During April 1997, a 6-year-old boy had bloody diarrhea of 10 days' duration, abdominal cramps, vomiting, and fever (104.9 F [41 C]). Stool culture yielded *Salmonella* serotype Typhimurium. The child was treated with ceftriaxone and amoxicillin/clavulanate. Nine days after the boy started therapy, his 3-year-old brother also developed diarrhea, and a stool sample yielded *S. Typhimurium*. No other family members became ill. The two boys shared a room with two corn snakes that they handled regularly. Stool cultures from the corn snakes yielded *S. Typhimurium*. The parents reported to health department staff that they were unaware that snakes are a source of salmonellosis.

Massachusetts. During May 1997, an 8-year-old boy with a congenital immune deficiency developed severe vomiting, abdominal cramps, bloody diarrhea, and head-

Salmonellosis — Continued

aches. Stool samples yielded *Salmonella* serotype St. Paul. The boy was ill for 14 days and received extensive supportive care at home. Three days before the boy became ill, the family had purchased two iguanas from a local pet store. The family was not informed by pet store personnel that reptiles are a source of salmonellosis; the child handled the reptiles, including putting them on his head and face. Before diagnostic testing could be performed, the reptiles were returned to the pet store. The parents informed the pet store owner of the child's illness, and the pet store owner reportedly was unaware that reptiles carry *Salmonella* spp.

Wisconsin. In December 1998, a previously healthy 5-month-old boy suddenly died at home. No significant macroscopic or histologic findings were revealed during autopsy; however, culture of a heart blood sample yielded *Salmonella* serotype Marina. The cause of death was attributed to *S. Marina* septicemia. The family had a pet iguana that had not come into direct contact with the infant. Culture of a stool sample taken from the iguana yielded *S. Marina*. Based on an interview, the parents were unaware that the infant was at risk for salmonellosis from indirect or direct contact with the iguana.

State Regulations for Preventing Reptile-Associated Salmonellosis

During March 1999, CDC contacted all 50 state health departments to determine whether state regulations existed for sale of reptiles and distribution of information about salmonellosis. Of the 48 states that responded, three (California, Connecticut, and Michigan) had regulations requiring pet stores to provide information about salmonellosis to persons purchasing a turtle; two states (Kansas and Maryland) require salmonellosis information to be provided to persons purchasing any reptile. Three states (Arizona, Minnesota, and Wyoming) prohibit reptiles in day care centers and long-term-care facilities.

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Editorial Note: In the United States, pet turtles were an important source of salmonellosis until commercial distribution of pet turtles <4 inches long was banned in 1975 (1). This ban led to a 77% reduction in the frequency of turtle-associated *Salmonella* serotypes isolated from humans during 1970–1976 (1). The popularity of other reptiles as pets is growing and has raised concerns about their impact on public health. This and other reports (2) demonstrate that reptile-related salmonellosis continues to pose a substantial threat to human health. Approximately 93,000 (7%) cases per year of *Salmonella* spp. infections are attributable to pet reptile or amphibian contact (3). An estimated 3% of households in the United States have a reptile (CDC, unpublished data, 1999). Many reptiles are colonized with *Salmonella* spp. and intermittently shed the organism in their feces (4). Persons become infected by ingesting *Salmonella* after handling a reptile or objects contaminated by a reptile and then failing to wash their hands properly. Either direct or indirect contact with infected reptiles and their environment can cause human illness (5,6).

Salmonellosis — Continued

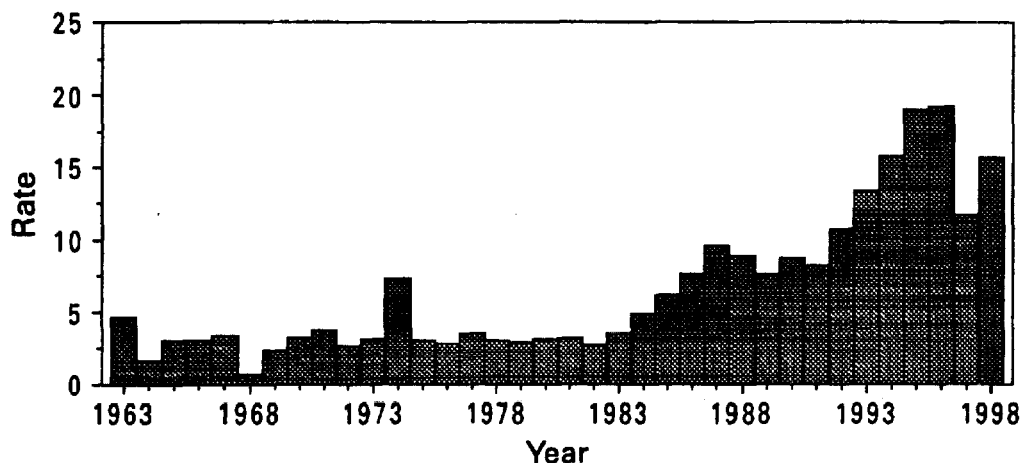
Rare *Salmonella* serotypes, such as Java, Marina, Stanley, Poona, and Chameleon associated with reptiles, increasingly have been isolated from humans (7) (Figure 1). For example, *S. Marina* isolates from humans increased from two in 1989 to 47 in 1998, and *S. Poona* increased from 199 in 1989 to 341 in 1998 (8). Isolation of rare serotypes of *Salmonella* spp. can alert public health staff about trends in the transmission of infection from reptiles to humans.

Most persons who contract reptile-associated salmonellosis are infants and young children. In 1994, 413 (81%) of 513 *S. Marina* cases occurred in children aged <1 year, whereas 4301 (14%) of 30,723 reported salmonellosis cases occurred in children aged <1 year (6). During 1989–1998, 516 (24%) of 2150 *Salmonella* isolates with reptile-associated serotypes were from children aged <4 years, whereas 50,755 (19%) of 267,131 other serotypes were from this age group (CDC, unpublished data, 1999). Because infants and immunocompromised persons are more susceptible to illness, many reptile-associated *Salmonella* infections involve serious complications, including septicemia and meningitis (9).

The risks for transmission of *Salmonella* spp. from reptiles to humans can be reduced by thoroughly washing hands with soap and water after handling reptiles or objects that have been in contact with reptiles and by preventing reptile contact with food-preparation areas. Children aged <5 years and immunocompromised persons should avoid direct and indirect contact with reptiles. Reptiles also should not be kept in homes of persons with children aged <1 year and in child care facilities (see box). All pet store personnel and reptile owners should be aware that reptiles can carry and transmit *Salmonella* spp. Pet stores are in a unique position to educate consumers because reptile owners obtain most of their information about their pet from pet store personnel. CDC and the Pet Industry Joint Advisory Council (PIJAC) have developed educational posters and brochures for use by veterinarians and pet stores on safe pet reptile handling.*

*Posters are available on request from PIJAC, telephone (800) 553-7387.

FIGURE 1. Rate* of reptile-associated *Salmonella* serotypes isolated from humans — United States, 1963–1998†



*Per 10,000,000 population.

†Reptile-associated serotypes are isolates from nonhumans reported to CDC and the U.S. Department of Agriculture that are isolated from reptiles ≥50% of the time.

*Salmonellosis — Continued***Recommendations for Preventing Transmission
of *Salmonella* from Reptiles to Humans**

- Pet store owners, veterinarians, and pediatricians should provide information to owners and potential purchasers of reptiles about the risk for acquiring salmonellosis from reptiles.
- Persons should always wash their hands thoroughly with soap and water after handling reptiles or reptile cages.
- Persons at increased risk for infection or serious complications of salmonellosis (e.g., children aged <5 years and immunocompromised persons) should avoid contact with reptiles.
- Pet reptiles should be kept out of households where children aged <1 year and immunocompromised persons live. Families expecting a new child should remove the pet reptile from the home before the infant arrives.
- Pet reptiles should not be kept in child care centers.
- Pet reptiles should not be allowed to roam freely throughout the home or living area.
- Pet reptiles should be kept out of kitchens and other food-preparation areas to prevent contamination. Kitchen sinks should not be used to bathe reptiles or to wash their dishes, cages, or aquariums. If bathtubs are used for these purposes, they should be cleaned thoroughly and disinfected with bleach.

The effectiveness of educating the public about reptile-associated salmonellosis needs to be evaluated. To enhance efforts to educate the public in a systematic, consistent, and timely manner, the National Association of State Public Health Veterinarians and the Council of State and Territorial Epidemiologists jointly recommend "that the appropriate state and local agencies enact legislation prohibiting the sale or gift of reptiles unless there is written point-of-sale education provided to consumers on the risks for and prevention of reptile-associated salmonellosis" (10). CDC will provide assistance to states interested in developing point-of-sale educational material; however, if these educational efforts should prove unsuccessful, states may wish to adopt restrictions for the sale of reptiles similar to those for turtles.

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Salmonellosis — Continued

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Assessment of Laboratory Tests for Plasma Homocysteine — Selected Laboratories, July–September 1998

Cardiovascular disease, including coronary heart disease and stroke, is the leading cause of death in the United States. Elevated plasma homocysteine (Hcy), generally defined as fasting plasma Hcy levels $>15 \mu\text{mol/L}$, is an independent risk factor for vascular diseases (1,2). It is unknown whether Hcy is a cause of or a marker for atherosclerosis. A recent statement by the Nutrition Committee of the American Heart Association concluded that until results of clinical trials are available, population-wide Hcy screening is not recommended (3). However, Hcy tests are used in the clinical setting and information on interlaboratory variation, on method variation, is limited. To assess the status of interlaboratory and intralaboratory variation for Hcy analysis, CDC conducted a study of selected laboratories during July–September 1998. This report summarizes findings from the study, which indicates a need to improve analytic precision and to decrease analytic differences among laboratories (4).

Fourteen laboratories participated in the study, including three manufacturers, two government, eight academic, and one clinical research laboratory. Each of three laboratories used two different methods. Selection of laboratories was based on the type of method used for Hcy testing: high-performance liquid chromatography (HPLC), gas chromatography-mass spectrometry (GC-MS), and immunoassay. Laboratories that used HPLC were further subdivided based on the type of detection each laboratory used (electrochemical or fluorescence) and by each of the types of reducing and labeling reagent each used to convert protein-bound and oxidized Hcy into free Hcy and to attach a fluorescent tag to the free Hcy for detection purposes. Laboratories using immunoassay were subdivided into two groups: those using fluorescence polarization immunoassay (FPIA) and those using enzyme immunoassay (EIA). Laboratories participated in a 2-day analysis of 46 blinded plasma samples, four blinded plasma samples with added Hcy, and three plasma quality-control (QC) pools. Interlaboratory and intralaboratory (i.e., between tests run in a laboratory) variation was expressed as a relative standard deviation*. In the absence of target values for the samples analyzed, the GC-MS method was considered arbitrarily as a reference method. Because it used stable-isotopically labeled Hcy as an internal standard, this method is considered to be the most accurate and precise assay available.

For all tests, the mean interlaboratory variation was 9.2% for plasma samples, 8.8% for plasma samples with added Hcy, and 7.6% for the QC pools (Table 1). The mean interlaboratory variation in each method group ranged from 3% to 13%. The group of laboratories performing the FPIA assay had the lowest interlaboratory variation (4.9% for plasma, 3.2% for plasma with added Hcy, and 3.2% for the QC pools). The mean intralaboratory variation was 5.6% for plasma samples, 4.9% for plasma samples with added Hcy, and 4.2% for the QC pools (Table 1). For most laboratories, the intralaboratory variation was $<10\%$ and the analytical recovery of added Hcy was 85%–115%.

* Relative standard deviation = standard deviation/mean $\times 100$.

Salmonellosis

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Clinical Features	Fever, abdominal cramps, and diarrhea (sometimes bloody). Occasionally can progress to sepsis.
Etiologic Agent	Enterobacteriaceae of the genus <i>Salmonella</i> . Approximately 200 serotypes cause human disease.
Incidence	An estimated 800,000 to 2 million cases occur annually; of these, approximately 40,000 are culture-confirmed cases reported to CDC.
Sequelae	Approximately 500 fatal cases occur each year; 2% of cases are complicated by chronic arthritis.
Transmission	Contaminated food, water, or contact with infected animals.
Risk Groups	Affects all age groups. Groups at greatest risk for severe or complicated disease include infants, the elderly, and persons with compromised immune systems.
Surveillance	National surveillance is conducted through the Public Health Laboratory Information System (PHLIS) for culture-confirmed cases and through the National Electronic Telecommunications System for Surveillance (NETSS). Active laboratory-based surveillance is conducted in selected sites.
Trends	<p>Half of salmonellosis cases are caused by two serotypes: <i>S. Enteritidis</i> (SE) and <i>S. Typhimurium</i> (ST).</p> <p>Proportion of salmonellosis caused by SE has increased markedly during last 2 decades; SE is now the most common cause of salmonellosis. Incidence of ST has remained stable, but an increasing proportion of isolates show resistance to multiple antimicrobial agents. Increasing problem of reptile-associated salmonellosis is caused by growing popularity of pet iguanas.</p>
Challenges	Assuring adequate supply of serotyping reagents; controlling SE infections through changes in the egg industry and education of food service workers and consumers; and developing effective education methods and materials to prevent reptile-associated salmonellosis.
Opportunities	Improving detection of dispersed outbreaks through use of statistical outbreak detection algorithms and providing this capability to state health departments; training state health department personnel in <i>Salmonella</i> serotyping; and encouraging judicious use of antimicrobial agents in veterinary medicine.

January 1998

[Centers for Disease Control and Prevention](#)

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Date: 2/7/00 7:04PM
Subject: reptile-associated salmonellosis data, years 1963-1998

Paul...Sorry for the delay. Hope these numbers are helpful...

Unpublished data, United States National Salmonella Surveillance System,
 Centers for Disease Control and Prevention.

Table 2.

Reptile-Associated Salmonella Serotype Isolates from Humans: Total numbers
 and population rates in comparison to overall Salmonella isolation,
 Years 1963-1998

(from Centers for Disease Control and Prevention Salmonella Surveillance Database, August 1999)					
Year	No. RAS Isolates (%)	RAS rate/10,000,000		Total No. Salmonella	
		U.S. Population			
Total rate/100,000					
1963	88 (0.5)	4.7	18649	9.9	189241798
1964	31 (0.1)	1.6	21113	11.0	191888791
1965	58 (0.3)	3.0	20865	10.7	194302963
1966	59 (0.3)	3.0	20040	10.2	196560338
1967	65 (0.3)	3.3	19723	9.9	198712056
1968	15 (0.1)	0.7	11066	5.4	204000665
1969	47 (0.4)	2.1	12144	6.0	204000665
1970	66 (0.5)	3.2	13754	6.7	204000665
1971	76 (0.5)	3.7	14557	7.0	206828966
1972	55 (0.4)	2.6	14931	7.1	209286088
1973	66 (0.4)	3.1	14884	7.0	211360233
1974	155 (1.2)	7.3	13294	6.2	213343944
1975	64 (0.5)	3.0	13167	6.1	215467514
1976	61 (0.4)	2.8	13819	6.2	217564624
1977	76 (0.5)	3.5	16329	7.4	219762255
1978	67 (0.4)	3.0	17014	7.7	222097449
1979	65 (0.4)	2.9	18325	8.2	224570142
1980	70 (0.4)	3.1	17329	7.6	227095101
1981	73 (0.3)	3.2	21681	9.5	229457995
1982	62 (0.3)	2.7	24445	10.6	231669666
1983	81 (0.3)	3.5	24993	10.7	233807728
1984	116 (0.4)	4.9	28170	11.9	235848704
1985	148 (0.3)	6.2	45799	19.2	237982255
1986	182 (0.5)	7.6	35533	14.8	240163947
1987	233 (0.6)	9.6	37266	15.4	242323182
1988	217 (0.6)	8.9	37816	15.5	244536431
1989	187 (0.5)	7.6	36251	14.7	246822376
1990	219 (0.6)	8.8	35803	14.4	249402268
1991	208 (0.6)	8.2	34637	11.7	252131171
1992	273 (0.9)	10.7	29618	11.6	255027532
1993	342 (1.1)	13.3	31815	12.3	257783004
1994	412 (1.2)	15.8	33271	12.8	260340990
1995	499 (1.4)	19.0	36828	14.0	262889634
1996	510 (1.5)	19.2	34865	11.1	265283783
1997	312 (1.1)	11.7	29081	10.9	267636061

1998	419 (1.5)	15.7	28439	10.6	267636061
Total	5376 (0.7)		776924		

Sincerely,
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